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Botanical Investigations in Wood Buffalo Park

Hugh M. Raup
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Botanical Investigations in Wood Buffalo Park

BY
Hugh M. Raup

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ERRATA

Figure 14. For Cleared hay meadow, *read* Poplar timber, chiefly *Populus tacamahacca*.

Page 114. For C. **Vahlii**, var. **inferalisma**, *read* var. **inferalpina**.

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Illustrations—*Continued*

BOTANICAL INVESTIGATIONS IN WOOD BUFFALO PARK

INTRODUCTION AND HISTORICAL SUMMARY[1]

Wood Buffalo park is a tract of nearly virgin wilderness, 17,300 square miles in extent (Figure 1), set aside by the Canadian Government for the preservation of the remnant herds of wild bison and other game or fur-bearing animals that inhabit it. It lies partly in northern Alberta and partly in southern Mackenzie, and has its administrative organization at Fort Smith, on Slave river. Wild life is completely protected within its boundaries, with the exception of certain limited hunting and trapping rights held by treaty Indians through long-standing agreements. As originally designated in 1922 its southern boundary was at Peace river. With the increase of the bison herds it was found necessary, in 1926, to enlarge the area to its present extent.

Investigations directed specifically to the plant cover of the country have been very meagre, and in most of the park area have never been attempted previous to the writer's activities. Some members of geological and topographical survey parties, and a few hunters and travellers have made minor collections or notes on the general aspects of the vegetation. Since the present report involves not only the floristic content of the vegetation, but also its geographic distribution and economic importance, these notes, even though random, have proved valuable in many cases. Most travellers have passed directly through by the main waterways—Athabaska, Peace, and Slave rivers—so their accounts largely duplicate one another. It is to the few who have got away from these routes and have described parts of the inland country that particular attention will be given in the brief sketch that follows.[2]

The earliest white travellers in the region, who have given us written accounts, were probably antedated by Canadian *coureurs des bois* who left no records. According to Petitot (1884), the family of Beaulieu had already become established at Salt river before the first of the traders descended the Slave (47). Samuel Hearne, who was the first to describe Great Slave lake, came to it from the north in the winter of 1771-72, and after crossing it departed eastward to Hudson bay, without having come far enough southward to enter the present park area (30). Peter Pond, a fur trader, descended Athabaska river in 1778 and built a trading post about 30 miles above Athabaska lake. Ten years later a post called Fort Chipewyan was established on Old Fort point, on the south shore of lake Athabaska, by the Northwest Company (4). This was later re-established on its present site at the western end of the north shore of the lake. Although a trading post had already been established on Great Slave lake by one Laurent Leroux in

[1] See References Cited, page 173, for all reference numbers inserted through text.

[2] For a more complete account of the exploration of the region see the writer's "Range Conditions in the Wood Buffalo Park," etc. (34).

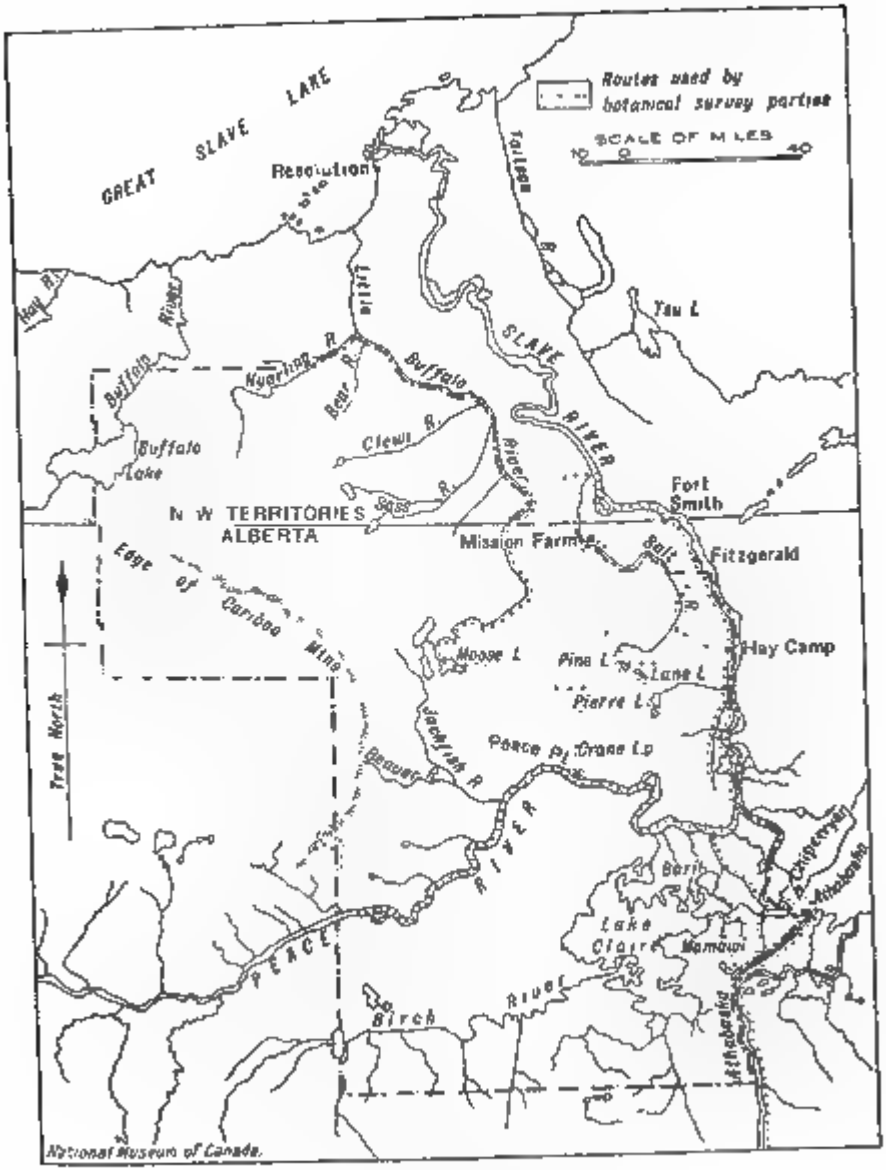


Figure 1 Map of Wood Buffalo park

[illegible] Alexander Mackenzie gives the first written description [illegible] and [illegible] Peace rivers which he navigated on his journeys to the [illegible] and [illegible] (6). The first good map of these waterways was [illegible] 1790-92 (5) but a very inaccurate one had been made in 1785 by Peter Pond (6).

The [illegible] records upon natural history were made during the [illegible] Sir John Franklin, a British naval officer [illegible] was surgeon and naturalist [illegible] and [illegible] North America (30, 31) [illegible] the [illegible] geographical exploration in the Arctic, a vast amount of [illegible] was gathered [illegible] the [illegible] and [illegible] of Mackenzie basin. [illegible] gave the first description of the Salt [illegible] river. Fur traders had [illegible] been [illegible] figure [illegible] which [illegible] from the present [illegible] Fort Smith [illegible] some [illegible] of the springs and [illegible] In [illegible] 1820 Franklin's party [illegible] the Salt [illegible] open prairie [illegible] downstream next day [illegible] the river.

[illegible] by Richardson must [illegible] the annotations found in [illegible] of the region [illegible] the locality. From what is now [illegible] Salt Plains it was evident that no accurate records were made there.

[illegible] the north followed much the same course through [illegible] described. Franklin on his second journey (20), [illegible] Back (2), Thomas Simpson (66) and Sir John Richardson (60) [illegible] the Salt [illegible] knowledge already gained. Back [illegible] a good picture of the [illegible] and springs. Thomas Simpson [illegible] in winter and instead of [illegible] the regular [illegible] the delta of the Athabaska took a route via Embarras [illegible] and a portage to a creek leading into lake Mamaw. No detailed description is presented.

In 1875 John Macoun made a canoe and boat journey down Peace river to Athabaska and thence up Athabaska and Clearwater rivers (40, 41). His account of the vegetation at the western end of the lake and in the [illegible] and Peace [illegible] and the first that was ever made. He [illegible] on the [illegible] but no specific collection [illegible] Emile Petitot, a Roman Catholic Missionary, well known for his [illegible] gives an early account [illegible] He [illegible] interesting notes upon the effects [illegible] in the vicinity.

In [illegible] Warburton Pike (49), an explorer and hunter, [illegible] from Resolution in search of the wood [illegible]. He [illegible] open prairie country west [illegible] Buffalo river [illegible] northern section of the park.

R G M [illegible] of the Geological Survey, Canada, visited the Salt Plains in 1887 [illegible] He made a careful examination of the geological features of the region.

[illegible] 61 a botanist from the University of Iowa entered the [illegible] 1893 [illegible] and ethnological [illegible] He [illegible] summer collecting in the Quatre [illegible] [illegible] of which gives a few notes [illegible] that area In January of 1894 he [illegible] Hudsonian zone, dwelling apparently the same [illegible] He [illegible] the woods and the nature of the country in somewhat more detail.

[illegible] 1892 Miss Elizabeth Taylor made the trip down the [illegible] Mackenzie to Peace and Lake Athabasca and made some plant collections [illegible] [illegible] of some interest [illegible] Wood Buffalo park

[illegible] 71 [illegible] on a similar journey [illegible] In February of that year with Indian guides [illegible] of Moose [illegible] Fitzgerald [illegible] and [illegible] and buffalo The party crossed Salt [illegible] open prairie country and entered a [illegible] with [illegible] and muskegs From [illegible] [illegible] passed close to Hart lake [illegible] [illegible] and [illegible] Moose [illegible] Lake Near the end of their outward trip they had a clear view of [illegible] [illegible] So far as the writer can find this is [illegible] [illegible] between the upper [illegible] [illegible] In [illegible] taking no account [illegible] [illegible] [illegible]

[illegible] A [illegible] 49 [illegible] park [illegible] on his two [illegible] [illegible] 1903 4 [illegible] the condition of the wood bison [illegible] [illegible] A list of trees and shrubs collected [illegible] [illegible] considerable interest

[illegible] 13th of the Geological Survey Canada made [illegible] [illegible] northwest of Fort Smith The first of [illegible] [illegible] into the Salt Plain district The [illegible] [illegible] park [illegible] the shore of Moose lake, [illegible] [illegible] and [illegible] On the third trip [illegible] [illegible] to headwaters and portaged to the head- [illegible] [illegible] he descended to Peace river His narrative [illegible] [illegible] notes on the topography and vegetation of the country he traversed

[illegible] [illegible] in 1907 [illegible] one to Fitzgerald and two from Fort Smith, in company with Major A M Jarvis of the Royal Canadian [illegible] [illegible] [illegible] The first of these trips [illegible] [illegible] [illegible] Mountain [illegible] [illegible] [illegible] was made entirely in a canoe [illegible] [illegible] [illegible] the Little [illegible] [illegible] [illegible] a western tributary [illegible] [illegible] [illegible] boundary of the park Setons [illegible] [illegible] [illegible] on the arrangement of the vegetation

He drew the first map of Nyarling river. A list of plants appears in an appendix to his book, prepared by E. A. Preble, his companion on part of the journey, and annotated by the author himself. The determinations of species are by J. M. Macoun.

Various parts of the present park area were patrolled by the Northwest Mounted Police between 1908 and 1911. Their reports(44) contain [illegible] information on topography and on the distribution of the major types of vegetation.

[illegible] the Salt Plain and upland country between [illegible] and Peace rivers in the summer of 1916, and wrote a report on [illegible] geography, geology and natural resources (20). A collection of [illegible] M. Macoun, and published [illegible] with a [illegible] the first [illegible] material brought from the Salt Plains. [illegible] the Ri[illegible] [illegible] about 20 m[illegible] Fort Smith.

[illegible] of Athabaska, Peace and [illegible] in a paper by F. M. Kindle (33, 34), who was [illegible] geological survey operations in Mackenzie basin. [illegible] of the post-Glacial geology of the [illegible] A. E. Cameron (8). In this the [illegible] and [illegible] traced to the [illegible] of the [illegible] vegetation. F. [illegible] a series of [illegible] in the [illegible] north of Peace river, and in 1922 [illegible] a map containing many [illegible] (43). He also wrote a brief account of the region [illegible] of the summer range of the wood buffalo by Maxwell Graham (29, 64).

John R[illegible], D.L.S., engaged in field work for the Topographical Survey, made a small collection of plants in the northern area of the park in the summer of 1926. The specimens came chiefly from along Sass[illegible] and Nyarling rivers and are well annotated as to locality and habitat. They were determined by the late Dr. M. O. Malte, Chief Botanist of the National Museum of Canada, and nearly all of them have been examined by the writer. This is the only material available from the northern area. The activities of the Topographical Survey between 1927 and 1929 have yielded an immense amount of information regarding the interior of the park. [illegible] H. Blanchet, D.L.S., drew a map published in blueprint form in 1927, [illegible] of the topography was attempted. Since that [illegible] southern half of the park has been mapped by aerial [illegible] (68). [illegible] photographs are particularly useful in [illegible] the vegetation.

The writer, assisted by his wife, carried on field work in the southern part of the park during the summers of 1928-29-30 for the National [illegible] the general direction of Dr. M[illegible] [illegible] Athabaska, Peace [illegible] 1926 and 1927 [illegible] also [illegible] report. The [illegible] [illegible] of the flora and the [illegible] less detailed local studies of distribution in certain areas. [illegible]

e following is an abbreviated itinerary of the writer's travels in Wood Buffalo park. (C) indicates

The account of the vegetation will be preceded by general d[illegible] of the topography, soils and geological history of the region. Detailed descriptions of these features in local areas, however, will be relegated to discussions of plant distribution.

The investigation would be incomplete without acknowledgment of the many kindnesses and the assistance rendered the field parties. It would be impossible to enumerate all those who have helped to forward the work, but the writer wishes to express his thanks especially to Mr. J. A. MacDougal, District Agent at Fort Smith, whose organization of the work supplied the necessary transportation, and to the officers of the Hudson's Bay Company, who have been most helpful in outfitting. Many persons have assisted in the systematic work on the flora, and will be mentioned as the occasion arises. Especial thanks are due to the Carnegie Museum of Pittsburgh, Pennsylvania, and to the Gray Herbarium of Harvard University for the use of the [illegible] and libraries in working up the material. The present report has been prepared during the writer's tenure of a National Research Council Fellowship in the Biological Sciences.

TOPOGRAPHY AND SOILS

The highest land in Wood Buffalo park is in Caribou Mountain plateau, only a part of which is inside the western boundary. This plateau [illegible] about 3,500 feet above sea level, and appears to be [illegible] upward. Very little of it has ever been [illegible], but judging from a few scattered references and the writer's [illegible] flat-topped, with margins deeply dissected by rapid streams. The eastern slope is of morainic materials and is gradual up to about 1,400 feet, where a noticeable steepening occurs, and there are what may be classed as terminal moraine deposits modified to form what appear to be shore terraces. At higher levels there are long, gradual slopes which have no rolling character.

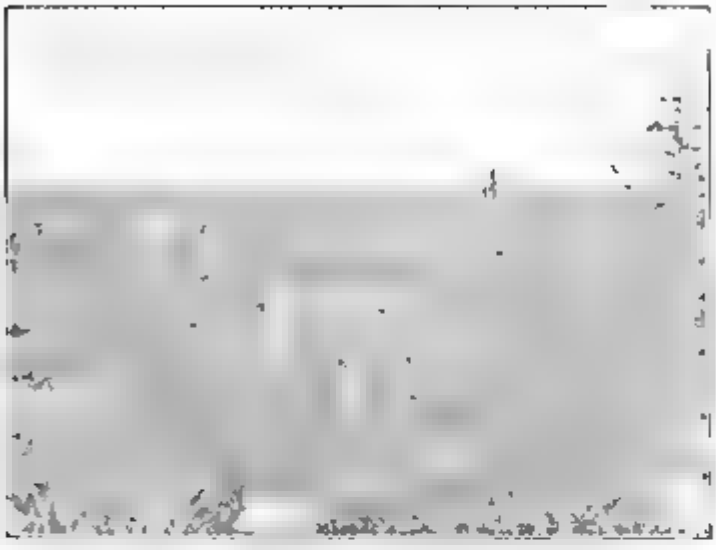
In a few places at an altitude of about 2,000 feet the writer has found bluish clay soils, part of which are known to have weathered, in situ, from shales that outcrop at this elevation. A discussion of these and their distribution will be found in a discussion of the forest types that appear on the upland.

The only other elevation of note is the northern margin of Birch mountain, which comes into the park along the southern boundary. This highland rises about 2,300 feet above the sea (21). Stretching north and east from these uplands is a gently rolling plain known as the Alberta plateau (22). A [illegible] its northern margin lies within the park, and is marked by a well-defined escarpment reaching from a region southwest of Fort Smith, northwestward and northward across Little Buffalo river, and finally westward toward Buffalo lake. Its position is marked by falls and rapids on the [illegible] Little Buffalo and on the western tributaries of this stream, such as [illegible] Bear and Sparling rivers. The Little Buffalo has cut a gorge [illegible] below the falls. In the area southwest of Fort Smith it is known as the Salt Mountain escarpment, and forms the southwestern border of the plain of Salt river. The southward extension of the escarpment has not been clearly defined.

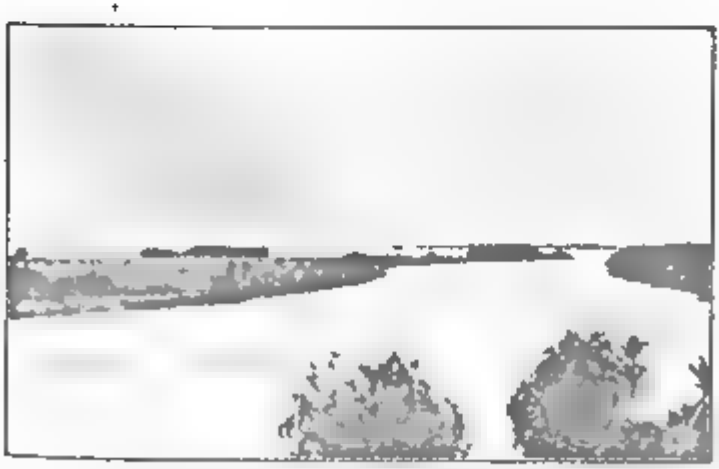
PLATE I

Longitude 114° 9' W., latitude 58° 51' N.,
[illegible] 300 feet.

PLATE VI



A. View on [illegible] on a small [illegible] north bank at the point where Little Buffalo River cuts through them



B. The Peace River district. Athabaska-Peace delta.

This part of Alberta plateau is a mature drained area, except for the valleys of the larger streams such as Peace and Athabaska rivers, which are gradual [illegible] deep broad valleys. The soils are sands clays, and [illegible] and moraine origin.

The [illegible] between the Salt Mountain escarpment and the base of [illegible] has been adequately described by Camsell[14] along the [illegible] It is a very gently rolling area broken only by [illegible] extending in a northeast-southwest direction between the Mountain [illegible] and the Nonabitt [illegible] country north of Little Buffalo [illegible] The extent of the range cannot be defined with the present [illegible] but its general position is sufficiently well known [illegible] The [illegible] appear to be of moraine origin and consist largely of sand with a variety of rounded [illegible] They are up to 150 feet above the general level and are [illegible] Their extending as near straight ridges [illegible] has been cut and the waters now notes bear [illegible] The [illegible] to the northwest and running for [illegible] of the point where the Little Buffalo [illegible] Between Moose lake and southward, the hills cover most of the country.

[illegible] are numerous sink holes of varying sizes [illegible] Some have lakes in them, [illegible] At least [illegible] among the Pine Lake-Moose Lake [illegible] There are lakes into which sizeable streams flow but from which there [illegible] The lakes are not [illegible] distributed over the country, but tend to be localized.

[illegible] and Caribou mountains is a broad [illegible] lake and wide muskegs. This depression [illegible] the Moose Lake basin is bounded on the south by ridges lying [illegible] Jackfish [illegible] has cut channels [illegible] Jackfish as being about 20 [illegible] Jackfish lake 10 [illegible] that this area was [illegible] in the margin of the basin. The [illegible] extension of the lake [illegible] has not been defined but probably [illegible] northwestward [illegible] of the Caribou plateau near to Buffalo lake. The only [illegible] in the basin are low boulder and sand ridges such as appear on the shore of Moose lake.

[illegible] west [illegible] ing north of the 60th parallel has not been [illegible] [illegible] indicate that it is [illegible] that about Pine lake.

[illegible] of the Buffalo and Salt rivers. Western [illegible] the Buffalo. The Sans Bear Clear and Nyarling form the drainage of the northern area. Salt river rises in McNeil [illegible] Moose Lake basin. [illegible] was crossed by [illegible] long and the [illegible] long only 4½ to be long and the [illegible] The [illegible] basin and in the upper part of their course [illegible] and [illegible] are [illegible] large tributaries but they are connected by [illegible] with larger bodies of water, such as Moose and Bug lakes. They are [illegible] but in many places

are full of rapids which are composed almost entirely of granite boulders of glacial origin. The rivers are [illegible] obstructed by beaver dams and log jams [illegible] which are very numerous.

There appear to be certain [illegible] types in the Alberta plateau district. Present knowledge [illegible] division into those with a preponderance of sand and gravel and heavier ones with a large [illegible] of clay. These [illegible] rather definite areas [illegible] regions. The [illegible] between [illegible] Lake [illegible] which [illegible] between [illegible] creek and [illegible]. The [illegible] west [illegible] Jack[illegible] and along the base of [illegible] mountains. It is [illegible] with a gentle slope [illegible] mountains. Both of these [illegible] for water supply [illegible]. A hole made by the [illegible] mountains [illegible] 24 inches. [illegible] about 13 inches [illegible] sand [illegible] June 26. Boulders and gravel are common [illegible] and where creeks from the mountains have cut deep ravines the [illegible] larger [illegible] are [illegible] brought down by the streams themselves.

The [illegible] are notable for the large amount of sand and rounded [illegible] representative of Alberta plateau [illegible] between Peace river and Birch mountains has not yet been [illegible] Alberta shows no indication [illegible] 67.

Between the Alberta plateau [illegible] and the present [illegible] of [illegible] about the 900-foot contour line. The northern and southern [illegible] are not well defined but it is known along [illegible] in the [illegible] settlement and [illegible] beyond the [illegible] of the Government Hay Camp. The inadequate descriptions of the country [illegible] indicate that there are representatives of it beyond the Little Buffalo. The [illegible] prairie at Peace point on Peace river is probably a southern extension but its occurrence south of the Peace is uncertain. The plain is nearly level except for some gently rolling areas and a few morainic hills or ridges. Drainage is by the streams above described as flowing from far back in Alberta plateau and by such smaller ones as Salt and Darrough creeks in the southern sections.

Over large areas there are poorly drained, [illegible] soils with many [illegible] on the surface. [illegible] from brine springs at the base of the escarpment to the west has left a thin deposit of salt in many of the depressions and caused most of the streams to be brackish. The section [illegible] known as the Salt Plain, and the [illegible]. Most of the early travellers [illegible] salt at the springs.

[illegible] and other smaller [illegible] and most of the [illegible] only a few feet above the [illegible]. Extensions of the lowlands reach down [illegible] to Fort Smith, up Peace river nearly

to Peace point and [illegible] up the valley of the Athabaska. The rivers meander [illegible] with many sand bars and abandoned channels [illegible]. Lakes [illegible] marshy deltas, [illegible] brought down by Peace River and Athabaska [illegible] of interlacing waterways.

The only marked relief features in the whole area are formed by granite [illegible]. These are glacially scoured and [illegible] patches of thin soils.

GEOLOGY AND PHYSIOGRAPHY

Nearly all of the surface of the park area is covered by moraine, fluvial or lacustrine deposits of recent geological time, but the position and nature of the underlying rocks have influenced the development of [illegible] an economy.

[illegible] Peace and Athabaska [illegible] represented along Peace [illegible] gypsum which [illegible] above Peace [illegible] Hay [illegible] and at Caribou [illegible] the salt [illegible] escarpment and its northeastward [illegible] about 60 feet, with the [illegible] underlying strata.

The Paleozoic [illegible] are [illegible] disturbed. Extensive sink-hole development in the Alberta plateau district, particularly toward the eastern parts, is indicative of the gypsiferous nature of the underlying rocks [illegible] and the presence of [illegible] underground drainage. Many [illegible] have [illegible] streams running into them but have no [illegible] outlets [illegible] Pine lake [illegible] resulting in a [illegible] map [illegible] to [illegible] Figure 2 [illegible] show clearly the [illegible] which have a definite alignment. Air photographs [illegible] definite arrangement, the [illegible] the water level is constant but in others [illegible] change is great [illegible] be caused by evaporation. In one [illegible] along the Pine Lake-Moose Lake trail the water [illegible] aquatic [illegible] feet above the present pond. The [illegible] that the water has fallen within the past few years. In a small lake about 6 miles south of [illegible] known locally as Round lake the water has been observed to change several feet in level within a year. Whether the change is cyclic and will reveal itself is unknown. There are well defined ancient shore-lines on Pine lake which are at least 10 feet above the present water-line.

Caribou and Birch Mountain areas are known or thought to be Cretaceous and are looked upon as erosion plateaux formed through the long continued denudation of the uplifted bottom of the Cretaceous sea.

deposits

the angle

[illegible] of the Peace below the site of Vermilion, and the lower Athabaska flood plain. The entire basins of Athabaska and Claire lakes [illegible] and the eastern shore was the margin of the Laurentian [illegible]. The flat lying country of the Salt Prairie southwest of Fort [illegible] was the bed of this lake.

As the general water level lowered to form the 800 foot lake, a part of it seems to have been maintained in the present Moose Lake basin, at the [illegible] by the [illegible] of Jackfish and Little Buffalo [illegible]. The morainic system above described served to pond the Little [illegible] across the Jackfish held back [illegible] of the water stream. The drainage of the basin has gone [illegible] and seems to be still in progress (12 56). Its rate [illegible] by the rate at which the streams have been able to cut through the barriers.

[illegible] that of Athabaska lake. The basins of Athabaska and Great Slave lakes were then separated, the former having [illegible] about half way to Smith [illegible] a great southern arm occupying the site of [illegible] and Little Buffalo [illegible] plains. In subsequent post [illegible] the extensions of the two lakes have been [illegible] to form [illegible] lake [illegible] meandering courses. [illegible] which these plains were formed has been well summarized [illegible] Geological Survey, Canada (13). Mr. Kindle [illegible] enormous amount of [illegible] and silt brought down by Athabaska and Peace rivers with the [illegible] of the deposits of [illegible] western end of lake Athabaska and on the south [illegible] Great Slave lake. A more detailed description of the lowlands [illegible] with the [illegible] of their vegetation.

[illegible] can be drawn the distribution of the clayey and sandy soils on the Alberta plateau seems to be correlated with the main morainic systems. In the retreat of the ice eastward from Caribou mountains [illegible] were [illegible] on the slopes of the mountains and in the hill country described between the [illegible] and Moosehorn Slough districts. Outwash from the latter front would tend to deposit its finer materials farther to the westward than the coarser ones. The clayey deposits at the base of the mountains may have originated in this way. To the eastward they disappear in the sand and gravel country south of Moose Lake basin. Similar soils found from the Pine Lake Lane Lake district to Flagstaff lake may have had a similar origin in some lake stage that existed immediately after the retreat of the ice eastward from the moraines that lie just west of them.

CLIMATE

Insufficient data are available for the interpretation except in a general way of climatic factors in their relation to the vegetation. For many years records of precipitation and temperature have been kept at various settlements but as there are very few evaporation or frost data it is difficult to turn these figures into anything that might correlate with local differences in vegetation. The most important considerations that can be discussed with present knowledge are the relative shortness of the season for plant growth,

[illegible] he effect of the short season upon the development of [illegible] and [illegible]. These [illegible] been brought out in part by J. M. [illegible] [illegible]

[illegible] character [illegible] evergreen [illegible]. The [illegible]

[illegible] and the [illegible] have been [illegible] 1928 [illegible] 1903 [illegible] and [illegible] 1928. The first [illegible] August. [illegible] Great Slave Lake [illegible] It [illegible] of Great Slave Lake [illegible]

A [illegible] for many years the [illegible] of the lakes and rivers [illegible] of the Peace and Athabaska [illegible] Athabaska Lake [illegible] May [illegible] the western [illegible] May [illegible]. The lake [illegible] usually [illegible] November. The [illegible] J. M. [illegible] In the autumn of 1919 he [illegible] October [illegible] and much floating [illegible] Athabaska Lake [illegible]. He [illegible] Athabaska [illegible] necessary [illegible] [illegible] according [illegible] in the latter part of October. The ground was frozen [illegible] between the latter part [illegible] November.

[illegible] open water in Athabaska Lake [illegible] in which the upper [illegible] of

[1] Temperatures given in th[illegible]

[2] Detailed meteorological da[illegible] have been supplied to the writer through the courtesy of the D[illegible] Toronto [illegible]

[illegible]

soil are not frozen. The vegetation in Wood Buffalo park usually has its spring aspect well developed during the first week of June. Birches and poplars are out in a small-leafed state on June 1, whereas *Pulsatilla hirsutissima* is rather past the height of its flowering and *Calypso borealis* is in its best development. In the spring of 1928, the writer found the Pine Lake region to be several days later in the development of its spring flora than the country nearer the river. The autumn is usually reckoned as beginning about the middle of August. The writer experienced freezing temperatures on the Salt Plain south-west of Fitzgerald on August 17, 1928, and this was not looked upon as an unusual year. The autumn flora, typified by the goldenrods and asters, and by the ripening of the fruits of raspberries, dogwoods, roses, moose-berries, and blueberries, is well advanced by the third week in August. Throughout the summer there is a notable "telescoping" of the seasonal aspects of the flora. *Calypso* has been found in flower as late as June 26 and goldenrods as early as July 19.

Records of rainfall are scanty, but indicate that during June, July, and August there are from 4 to 6 inches (Table 2). Snowfall for the whole year averages between 34 and 53 inches in different localities (Table 3).

As suggested above, the presence of the larger lakes has a slight ameliorating influence upon neighbouring climatic conditions. Monthly mean and absolute minimum and maximum temperatures for January and July recorded at Chipewyan, Vermilion, Fort Smith, Hay River, and Resolution, when averaged over a period of ten years (1917-26) (Table 1), indicate that in winter lower temperatures are experienced at Fort Smith and Vermilion than at settlements on the lakes. Cool periods in summer reach lower temperatures inland than on the lakes, whereas warm periods in summer tend to be warmer inland. Of the two inland districts, Fort Smith consistently shows less fluctuation than does Vermilion, probably due

TABLE 1

Table of Temperatures Averaged over a Period of Ten Years, 1917-1926

		Chipewyan	Vermilion	Fort Smith	Hay River	Resolution
Monthly mean minimum	Jan.	19·6	24·5	−24·0	−22·4	−22·4[1]
	July	51·1	46·1	46·7	50·0	51·2
Absolute minimum.	Jan.	49·0	−36·1	−53·9	−49·4	−47·9[2]
	July	35·3	33·2	23·2	35·4	40·5
Monthly mean maximum	Jan.	−2·1	0·3	−7·5	−4·3[2]	−3·9[2]
	July	72·8	74·0	73·5	69·2	66·6
Absolute maximum	Jan.	29·2	29·0	18·2	28·1[2]	15·9[2]
	July	86·4	88·3	86·1	86·5	83·4

[1] Averaged over seven years, 1920-26 due to lack of records.
[2] Averaged over nine years, records for 1918 being absent.

TABLE 2

Total Rainfall (in Inches) During June, July, and August, 1917-1926

—	Chipewyan	Vermilion	Fort Smith	Hay River	Resolution
1917	4·07	4·95	6·31	3·09	3 52
918	5·44	5·24	3·92	4 24	1 63
1919.	6·32	10·26	6·96	5·39	5·92
1920	2 50	5 96	[1]	5·90	5·25
1921	5 14	6·19	10·52	9·12	4 79
1922	5 19	6·44	5·07	6·73	4·82
1923	1·91	5·99	6·22	2·92	0·80
1924	5 09	3·32	3·68	3 45	5·54
1925.	2·11	6 87	3 55	3·66	4 10
926	[1]	5·64	3 29	4 88	4 77
Average	4 21	6·27	5·36	4·90	4 31

[1] Incomplete records.

TABLE 3

Total Snowfall (in Inches) During Each Year, 1917-1926

—	Chipewyan	Vermilion	Fort Smith	Hay River	Resolution
1917	82·4	36 0	22·8	40·5	39·0
918.	105 8	54 7	60·2	50·1	57 0
919	32 3	27·6	50·2	37·6	39 7
920	25·0	23·9	34·6	41 8	49·8
92	33 5	31 1	24·3	47 3	40·7
1922	85·5	33·9	31·3	39 8	38·8
923	24·5	24·4	50·6	57 8	38 8
924	52·0	42·6	31 5	74 0	54 0
925.	46·5	39·3	37 0	42·3	72·0
1926.	45·3	29·3	41·9	32·0	78·1
Average	53·29	34·28	37·33	45 38	50·59

to its position between two great lake basins. In its winter maxima it shows a close relationship with lake shore conditions. The highest temperatures ever recorded were at Vermilion in 1912, when the thermometer reached 101 degrees. Ninety degrees is not an uncommon temperature throughout the region. The rainfall tables indicate greater precipitation in the summer months inland than on the lakes, whereas the snowfall during the rest of the year is greater on the lakes than inland. July and August are the only two months of the year in which snow has never been recorded.

The permanent frozen condition of the soil at comparatively shallow depths and the short season during which the surface is thawed influence the development and distribution of the vegetation by limiting root development, affecting the position of the water table and the nature of the drainage, slowing down the process of humus development, and by allowing only a short period of the year when physiographic changes can take place. Open prairies were found frozen at a depth of 37 inches on June 26, and in the early part of August frost was found at about 5 feet on the cleared bank

of Slave river at the Government Hay Camp. On July 12 frost was found at almost one foot on a hillside exposed to the noonday sun high on the eastern slope [illegible]. No deep-rooted plants may enter such [illegible] unless they can adapt themselves.

The [illegible] of [illegible] frozen soil [illegible] below the ground level would tend to lessen the amount of seepage through the soil and increase the run-off. [illegible] regions [illegible] in the the extensive [illegible] bogs with their [illegible] vegetation of [illegible]. The [illegible] weather in which [illegible] are greatly retarded has a strong [illegible] in the development [illegible] changes in the soil [illegible] dependent upon topographic change and [illegible] lower areas for colonization by plants are greatly [illegible] the shortness of the season and also for erosion and deposition. These retarding results are especially significant in a study of young [illegible] beginning their development on the recently exposed [illegible] surfaces in the Athabaska-Great Slave Lake region.

A [illegible] field for investigation that may be mentioned in this connection is the degree to which [illegible] to enter the regions [illegible] those that are able to live with a [illegible] amount [illegible]. [illegible] nitrogen and plants that inhabit them must either get along with this small amount or have some means of utilizing atmospheric nitrogen or nitrogen that has been fixed by other plants.

TYPES OF VEGETATION IN WOOD BUFFALO PARK

Coniferous forest is the predominating vegetation in Wood Buffalo park. Although the [illegible] different in some respects from that in other regions, the [illegible] part of the extensive belt of conifers that extends from the [illegible] basin to Alaska and sends its representatives southward [illegible] the mountain [illegible] of the continent. Canada spruce (*Picea glauca*) and jack pine (*Pinus Banksiana*) are by far the commonest species in the timber, the former occurring mostly upon the better soils of the uplands and along the major streams and the latter being confined to [illegible] dry, sandy knolls and plains.

The [illegible] along the rivers gets an erroneous idea, however, of the [illegible] extent of the forest, since the banks are usually clothed with [illegible] growth [illegible]. Journeys [illegible] and together with examination [illegible] are largely confined to the banks of the present rivers. The largest coniferous stands [illegible] westward [illegible] Lake [illegible] and [illegible] westward across Little Buffalo river. Other [illegible] forested areas are on the eastern slopes of Caribou Mountain plateau. The timber is confined largely to sandy and gravelly, well-drained soils.

forests to the southeast.

seasons. Much of the Salt Plain [illegible] barren or semi-barren flats which are the bottoms of shallow ponds [illegible] spring and early summer. The water in these ponds is somewhat [illegible] due to the outwash from the salt springs of the region [illegible] the flats has a distinctly halophytic character [illegible] maritima, and [illegible] are common in the more saline areas. [illegible] blue-joint grass Calamagrostis [illegible] saline and [illegible]. The widest [illegible] prairies [illegible] the Salt Plains. Small local areas are [illegible] hores.

The [illegible] of the lower Peace and Athabaska [illegible] Lake Mamawi basin have extensive marshes ranging [illegible] aquatic shore associations to grasslands. The [illegible] are separated by natural levees and other [illegible] formed by the meandering channels of the rivers. These [illegible] better drained [illegible] willow clumps or timber on them. [illegible] blue-joint grass Calamagrostis [illegible] These [illegible] lowlands. Minor flood [illegible] streams that drain the uplands, [illegible] Buffalo rivers. The vegetation on these is similar [illegible]

F[illegible] that the most extensive timbered areas are on uplands that have been exposed since the lowering of the post Glacial lake that stood at about the 1100 foot level. They do [illegible] district [illegible] Lake, Big Lake [illegible] open prairies on the [illegible] the north-west [illegible] lake and at the base of Caribou Mountain [illegible]. The prairies [illegible] their widest spread in the country south and west of Fort [illegible] under the lake that stood at about the 900 foot level. The slough and timber vegetation of the lowlands is grow[illegible] the alluvial deposits that have been formed in the last of the [illegible] which stood only a few feet above the present water level of Lake Athabaska.

The ensuing [illegible] detailed discussion will follow the general outline given in the preceding paragraph.

THE UPLAND FORESTS

The richest forests in Wood Buffalo park are of Canada spruce *Picea glauca*. They have a comparatively [illegible] flora with very little undergrowth [illegible] mosses that forms most of the ground cover is at most only 4 to 6 inches deep, over a leaf mould seldom exceeding 4 inches in thickness.

Primary spp.
- *Picea glauca*
- *Salix Bebbiana*
- *Hypnum Crista-castrensis*[1]
- *H. Schreberi*

[1] The writer is indebted to Prof. J. Franklin Collins of Brown University for determinations of the mosses listed.

Secondary spp. *Equisetum sylvaticum*
E. scirpoides
Lycopodium annotinum
Maianthemum canadense
Goodyera repens var. *ophioides*
Habenaria obtusata
Orchis rotundifolia
Corallorrhiza trifida
Calypso borealis
Betula papyrifera var. *neoalaskana*
Alnus crispa
Geocaulon lividum
Ribes lacustre
R. triste
Mitella nuda
Rosa acicularis
Shepherdia canadensis
Cornus canadensis
Arctostaphylos rubra
Pyrola asarifolia
P. asarifolia var. *incarnata*
P. chlorantha
P. secunda
Moneses uniflora
Linnaea borealis var. *americana*
Peltigera aphthosa

The secondary[1] species are much scattered in their distribution. In places it is possible to walk a hundred yards or more without seeing any other ground cover than the mosses. The absence of many species that are widespread in the Canadian forests elsewhere has been noted by the writer in another place (53). If undisturbed by fire or clearing the spruce timber seems to perpetuate itself and to be the most advanced form of mesophytism the region affords. However due probably to a slow rate of soil development and the short time available since much of the country was exposed for the immigration of plants, such species of the more mesophytic forests of Ontario, British Columbia, or even of parts of Alaska, as *Habenaria orbiculata*, *Goodyera decipens*, *Listera cordata*, *Cypripedium parviflorum*, *Lycopodium lucidulum*, *Circaea alpina*, and others are either entirely absent from the forests under discussion or are extremely localized in them.

The spruce timber is found chiefly on soils of medium drainage, which usually occur on the lower slopes of hills and in hollows where there is sufficient drainage to prevent the formation of muskegs. Such conditions are most abundant in the sandy moraine country that extends from a point a few miles north of Peace point northward and northwestward beyond Little Buffalo river. They are probably common also in the northern area of the park between Little Buffalo river and Buffalo lake, and also in the moraine country that crosses Jackfish river south of Moose Lake basin. Parts of the eastern slopes of Caribou mountains are covered with a dense spruce forest, much of which is of small trees with an unusually scanty undergrowth.

The lodgepole pine, *Pinus contorta* var. *latifolia*, timber on the summits of Caribou mountain plateau has not been studied extensively

[1] Lists of secondary species will include only ferns and flowering plants, with the exception of a few species of mosses or lichens that are particularly characteristic of the habitats in question.

It was observed on July 11 and 12, 1930, in a region about 16 miles northwest of Lubbar gravel pit, Peace river, and at an elevation of about 2,000 feet above [illegible]. The pine is most abundant on [illegible] knolls which [illegible] black spruce. [illegible] and [illegible] that the [illegible] forest of the [illegible] region of western Alberta [illegible] Canada and has a spruce [illegible] black spruce [illegible] between [illegible] mixed with [illegible] rather abundant [illegible]. The [illegible] and there is a scattering [illegible] *Populum* [illegible] *Lycopodium* [illegible] and *Ledum* [illegible] forest is a more devel[illegible]. In several places [illegible] stages of existence surrounded [illegible]. In the more open conditions [illegible]. The [illegible] sand [illegible] at a depth of about 1 foot at the time [illegible] during a good part of the day.

[illegible] the southward, [illegible] cretaceous shale at about the same elevation was found on [illegible] scattered [illegible] have no [illegible] front. [illegible] by the recent [illegible] *Pinus contorta* [illegible] and [illegible] *Betula papyrifera* var. *neoalaskana*, [illegible] spruce *Picea glauca*. [illegible] along a [illegible] black spruce [illegible]. The entire flora [illegible] resembles closely [illegible] contrasted with a [illegible] ridge. On the opposite side of the creek [illegible] are morainic deposits that reach an altitude of about 2,[illegible] feet upon which is a forest of Canada spruce *Picea glauca* and aspen *Populus tremuloides*.

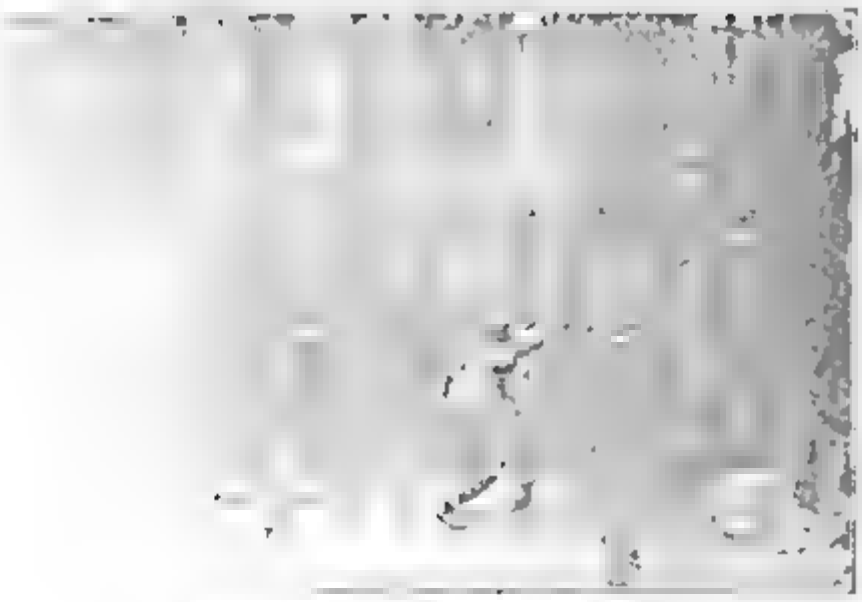
It seems probable that certain areas, even if they were crossed by [illegible] drift materials or that if such materials were left [illegible] present [illegible]. Should the latter be [illegible] the cover in the form of gravels or coarser materials [illegible] stream channels [illegible] the first of the [illegible]. In the [illegible] of the [illegible] sand gravel and [illegible]. In the small [illegible] the water there was no evidence of stratification [illegible] could any be seen in the bed of a small brook draining an upland muskeg on these soils.

If this reasoning is correct, then the oldest [illegible] in Wood Buffalo park is that of lodgepole pine *Pinus contorta* var. *latifolia*, and black spruce *Picea mariana*, on the [illegible] which stand above the [illegible] with [illegible] and sand [illegible] ale and [illegible] in both age and floristic content with the [illegible] west of the upper Peace drainage. Certain areas of it may have been exposed to plant cover during at least the [illegible] of Pleistocene ice.

The ridges and sand plains on the moraine uplands are usually clothed with [illegible] of jackpine *Pinus banksiana*. The [illegible] the park [illegible] on the [illegible] these ridges the main [illegible] of [illegible]. The [illegible] and [illegible] almost [illegible] and [illegible] have [illegible] from the [illegible] a pure stand of the pine with ground cover mainly of [illegible] *Cladonia alpestris*, *Cetraria nivalis*, and others, broken here and there by small patches of cranberry *Vaccinium Vitis-idaea* var. *minus*.

The [illegible] of the levels of the [illegible] dammed lake that [illegible] in Moose Lake basin has exposed low sandy ridges, some of which [illegible] and [illegible]. These ridges show [illegible] vegetation [illegible] grass [illegible] Pine lake, where a series of [illegible] an open [illegible] and shows that the [illegible] younger time. The question [illegible] whether the [illegible] vegetation on the higher ridges when these were [illegible] after [illegible] the [illegible] lake has not been [illegible] that each was not the case 52. The [illegible] *Pinus Banksiana* at the present time indicate the [illegible] the most exposed [illegible]. It has [illegible] a few scattered [illegible] south of the [illegible] where is normal [illegible] ridges is taken by Canada spruce. In Wood Buffalo park there is a high [illegible] southeast of Lane lake which stands [illegible] above the surrounding country. The pine disappears on [illegible] where there is a patch of timber of spruce [illegible] to that [illegible] to the northeast. The [illegible] on the hill top [illegible] a more [illegible] character with *Cetraria* [illegible] as an abundant [illegible]. It seems reasonable to suppose that Canada spruce was the first [illegible] ridges [illegible] and that it has persisted on the more [illegible]. The [illegible] spruce woods would probably be easily [illegible] by jackpine if they occurred at a lower level.

Under [illegible] state of stages of a transition to the [illegible] [illegible] There appears to be little question that [illegible] when undisturbed is to spruce. Many of these stages [illegible] shown in the vicinity of Pine lake, where the [illegible] has [illegible] on several occasions. The first changes came with the introduction of a scattering of shrubs and perennial herbs, and with the



invasion of moisture-loving mosses and lichens of the woodlands. The common floristic content of what might be called a mature jackpine *Pinus Banksiana* forest is as follows

Primary spp.	*Pinus Banksiana*
	Alnus crispa
	Cladonia alpestris
	Peltigera ophthosa
	Vaccinium Vitis-idaea var. *minus*
	Hypnum Crista-castrensis
	H. Schreberi
	Polytrichum juniperinum
Secondary spp.	*Picea glauca* (small saplings)
	Elymus innovatus
	Maianthemum canadense
	Populus tremuloides (small saplings)
	Salix Bebbiana
	Betula papyrifera var. *neoalaskana*
	Geocaulon lividum
	Pulsatilla ludoviciana
	Fragaria glauca
	Rosa acicularis (small bushes)
	Shepherdia canadensis
	Epilobium angustifolium
	Cornus canadensis
	Arctostaphylos Uva-ursi
	Galium boreale
	Linnaea borealis var. *americana*
	Viburnum pauciflorum (small bushes)
	Campanula rotundifolia

The scattered secondary species indicate the trend toward mesophytism above noted. The young spruce trees are thriving in the shade of the pines and in the soils which by the accumulation of vegetable remains, are increasing their water-holding capacity and their supply of nutrient materials. As the spruce trees grow to such a size that they can shade the now moister ground the pines fail to germinate. A common forest type on the uplands is one in which there is a vigorous stand of young spruce trees with a growing mat of mosses beneath them and scattered among them a few ancient pines with great arching branches that are leafless except at their very tips. Semi-decayed logs in such woods prove to be those of the former pine forest. Old fallen trees in spruce forests of the more mesophytic type are of spruces, indicating the relative perpetuity of this type.

Extensive forest fires have seriously modified vast areas of Wood Buffalo park, so that the resulting deciduous or partly deciduous woodlands are among the commonest types of vegetation. The amount of influence exerted by a fire depends upon the nature of the fire and upon the stage of development of the timber burned. A crown fire, driven by a high wind burns the leaves of the conifers and kills the trees, but does not greatly affect the ground layer. In such a case the timber seems to return to its former condition without much delay. On a sandy hill at the east side of Pine lake there is a heavy spruce forest with occasional large aspens *Populus tremuloides* in it. There are a great many old windfalls that show evidence of having been killed by fire.

but there is a thick ground cover of mosses and a layer of humus about 4 inches thick. These facts indicate that the last timber was burned in such a way as to kill the trees without injuring the humus and ground cover. A few aspens came in with the young spruces following the fire but all except the most hardy were crowded out by the rapidly growing conifers.

A piece of woods south of Pine Lake has in recent years suffered a burn which did not seriously injure the ground cover. There was formerly a mature jackpine forest with some aspens in it as indicated by the windfalls. The young trees now coming into the area are aspen and poplar the latter showing dense stands of strong trees. Evidently the course of the succession was not seriously affected.

When immature jackpine woods are burned there is an immediate and abundant growth of seedling pines with a very few aspens. The pines grow thus at an early age. The ground cover is so thin in such a case that a ground fire does little more damage than a crown fire except to consume a ready rather sterile. If it burned the ground cover badly it would lessen the viability of seeds but this would only slightly lengthen the period of its return to pine woods.

In the case of older woods that have been badly burned by ground fires notable exceptions to the normal succession of the vegetation occur. It is in such areas that the greatest growth of deciduous timber is found. The woods immediately around the Pine Lake ranger station consist mostly of aspens and poplars.

The deciduous timber is of two types. The aspen woods and the poplar-spruce woods. The first of these is the most abundant and next to the mature spruce forest it is the thickest timber in the region. It also contains the greatest number of species. The aspens form a close stand of trees 50 to 80 feet high and reaching 12 to 20 inches in diameter with straight clean boles. Other occasional trees are balsam poplar *Populus balsamifera* Canada spruce and jackpine. The pines are all straggly trees that are evidently remnants of the burn. The poplars and spruces are all young trees coming up in the shade of the aspens. A low net shrub and young tree flora is formed mainly of grey willow *Salix Bebbiana* and aspen poplars. Other less common shrubs are *Shepherdia canadensis Amelanchier florida Rosa acicularis Lonicera involucrata Viburnum pauciflorum* and *Symphoricarpos albus* var *pauciflorus*. The ground is covered with dead leaves and other plant parts but there are almost no mosses and lichens. The leaf mould is 1½ to 2 inches thick on a sandy substratum. The primary herbaceous species is a grass *Agropyron macrourum*. It does not form a turf but is very common considering its woof and habitat. About thirty species of herbaceous plants occur, with none in very great numbers. This seems to be a sort of common ground for most of the herbs of the other forest types but *Botrychium Lunaria Habenaria viridis* var *bracteata Delphinium scopulorum* var *simulans Thalictrum venulosum Lathyrus ochroleucus Lilium americanum, Aster ciliolatus* and *A. Engelmanni* may be considered characteristic.

Occurring in patches in the aspen woods may be found the second type of deciduous timber in which balsam poplars accompanied by spruces have superseded the aspens. A good view of the conditions may be gained

from the top of a fire tower on the ridge just west of the Pine Lake ranger station. The darker green foliage of the jackpines and dark points of the spruces are just appearing above the tall aspens. The shrub layer loses many of the willows and Shepherdia canadensis, *Rosa acicularis* and *Viburnum pauciflorum* become predominant though scattered. A notable change occurs in the ground layer by the new growth of the woodland mosses and lichens. In the dense shade of the spruces the herb flora is reduced to *Maianthemum canadense*, *Rubus pubescens*, *Pyrola asarifolia*, *Linnaea borealis* var. *americana* and a few scattered grasses. The poplar-spruce woods appear to be merely a stage of development of the mature spruce timber from the aspen woods, the aspen in turn being introduced by burning.

During the field seasons of 1929-30 the writer had several opportunities to observe the initial vegetation that follows new burns. A very destructive fire swept a strip of country extending north and south between Pine and Moose lakes in 1928, and the burning continued as late as October of that year. The first plants to appear in the growing season of 1929 were the waterleaf *Phacelia franklinii*, *Corydalis* [illegible] *aurea*, geranium *Geranium Bicknellii*, fragrant [illegible] *Dracocephalum parviflorum*, and the liverwort *Marchantia polymorpha*. In recently burned spruce woods along Little Buffalo river and on the lower slopes of Caribou mountains were found large numbers of the sponge mushroom *Morchella conica*, which attains a height of 4 to 6 inches.

So little clearing has been done that it is impossible to tell the exact effects of it. The general effects, judging from the evidences around cabins, are not much different from those of a mild burn. The ground cover is not removed, and the growing timber seems to return rather quickly to its former state with a certain amount of intermingling of deciduous species. A relatively unimportant influence which is modifying the upland forest in some areas is the wallowing activity of the buffalo herds. These animals find a favourite resort for rubbing and fighting flies during the summer in the open pine woods. The soil is not rooted so that it can be easily torn up and the dry sand is used to roll in. The trees are slowly being killed by having their bark rubbed off a short distance above the ground. The writer has examined no areas in which this process has been carried to the extreme, but there are many wallows in the Pine Lake district that show minor plant associations introduced by partial clearing. The common herbaceous species of cabin clearings throughout the region make their appearance upon the cleared ground. Whitlow grass *Draba nemorosa*, chickweed *Cerastium nutans*, bird seed *Lepidium apetalum* and strawberry blight *Chenopodium capitatum* are the first invaders of new wallows. Later comes a more varied mixture of grasses and other herbs, such as five-finger *Potentilla norvegica* var. *hirsuta*, goldenrod *Solidago oreophila*, chickweed *Stellaria longipes* var. *laeta*, foxtail *Alopecurus aequalis*, blue grass *Poa glauca*, and a few others.

Figure 2 is a map of Pine Lake and the vegetation in its vicinity, derived partly from the writer's field studies and partly from aerial photographs. The predominance of woods and over semi-open country is manifest, as well as the large proportion of the timber which is deciduous.

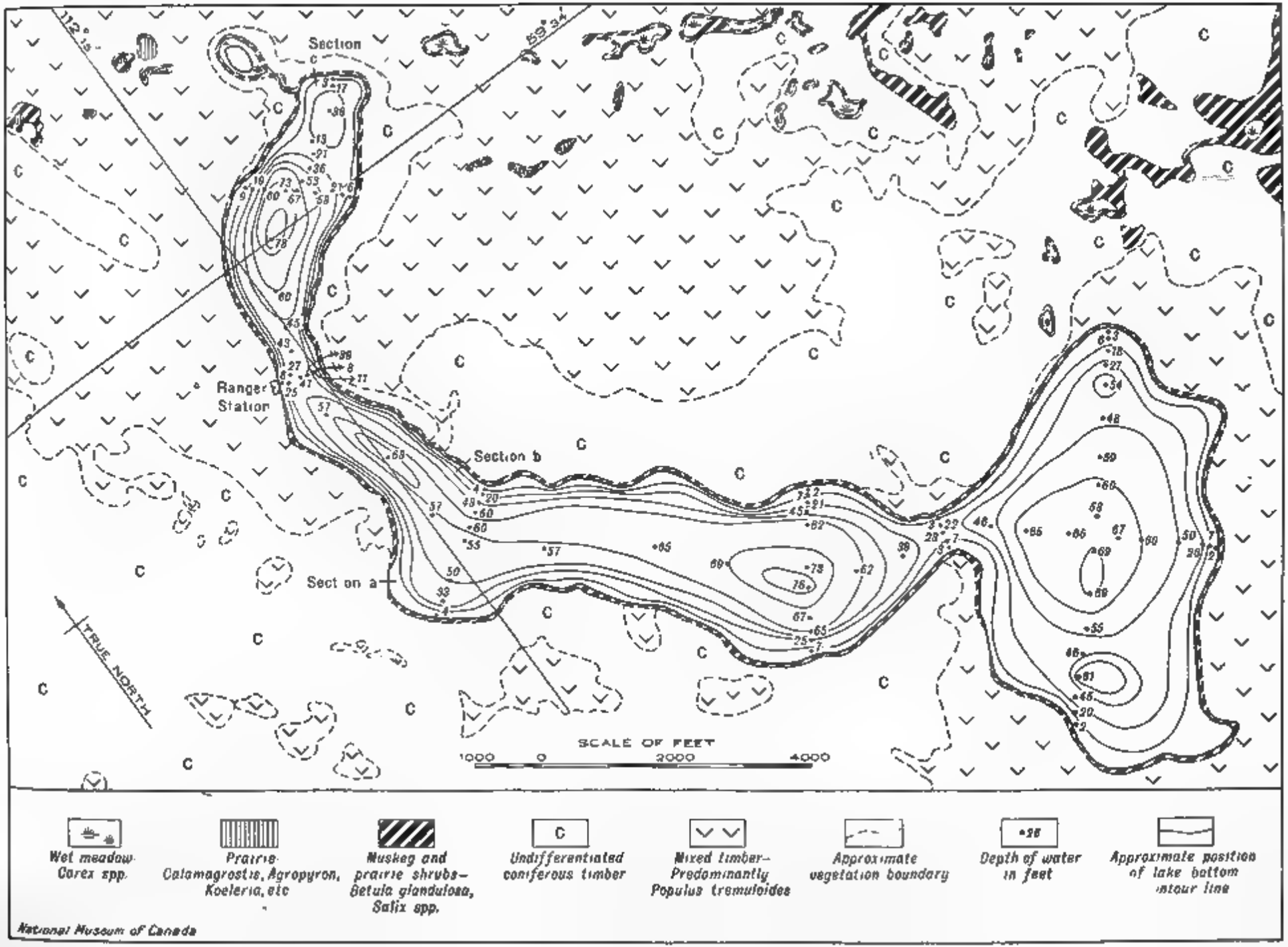


Figure 2. Map of vegetation in the vicinity of Pine lake.

UPLAND LAKE SHORE VEGETATION

Throughout the upland districts of the park there are numerous small lakes and ponds of various sizes and origins. Some are formed through the [illegible] drainage by [illegible] moraines and may be [illegible] as [illegible] have been covered in the cutting [illegible]. Many of the lakes in the Moose Lake have [illegible]. They are [illegible] and [illegible] of the [illegible]. Many small lakes are [illegible] region. There [illegible] in [illegible] Buffalo River and its [illegible] and [illegible] more [illegible]. These have irregular shores [illegible]. There are [illegible] large [illegible] lakes [illegible] to a [illegible] deep [illegible] of shore forms. The lake [illegible] and occupies a series of large sink holes [illegible]. The level of the lake has not changed much for a long period but the ancient beaches on the [illegible] indicate that there has been a certain amount of fluctuation.

A chain of small sink-hole lakes southeast of Pine Lake, the shores of which are more gently sloping, show all gradations between clean shores and very marshy or boggy ones. Sink holes with rapidly sloping banks [illegible] have relatively clean shore lines probably due to the fact that [illegible] marsh vegetation has no time to become established before [illegible] dried out.

Although no rigid lines may be drawn between different kinds of lake shores, [illegible] classification into those with abrupt, relatively clean borders and those bordered by some form of swamp will be useful. [illegible] those that have marsh [illegible]. A glance at the [illegible] most of them are to be [illegible] Moose Lake [illegible] around the [illegible] mountains. These are mostly shallow with marsh or [illegible]. The deep sink hole lakes appear to be commonest upon the morainic upland areas.

The [illegible] arrangement of vegetation on the lake shores shows [illegible] country, but there is a fairly uniform [illegible] trend. The [illegible] water are usually [illegible] and the first plants to appear [illegible] as the water shallows are species of pond weeds *Potamogeton*. Still farther inshore are bulrushes *Scirpus*

Plate V

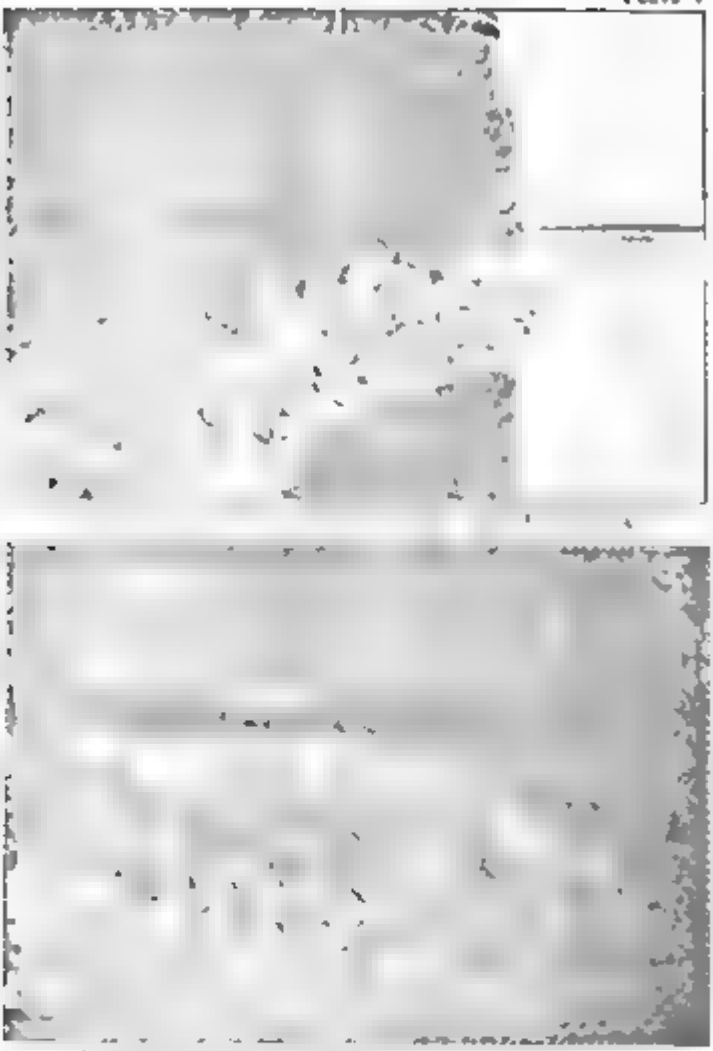


Figure 1 B

validus, or cow lilies *Nymphozanthus variegatus*, or both, with occasionally other emergent sedges and grasses. At the actual shore-line one finds characteristic species as cat tail *Typha latifolia* or some species of bur-reed *Sparganium* or sedge *Carex*. There is usually a low ridge or wet meadow back from the shore dominated by sedges and grasses, and margined by willows. The main deviations from this trend occur on very steep, rocky or sandy shores and on mossy borders of muskeg ponds, as the following discussions will show.

More or less detailed studies of upland lake shores have been made at Moose lake, Pine lake, a small lake near upper Salt river north of Pine lake, at a small lake near the base of Caribou mountains about 20 miles north of Indian graveyard, Peace river, and at some small lakes southeast of Pine lake. The main results of these studies have been checked with a large number of minor observations throughout the region, so that the writer is confident that they are fairly typical.

AQUATIC ASSOCIATIONS

The deepest parts of the sink-hole lakes seem to be quite barren of vegetation. A great many soundings were made in Pine and Lane lakes in an effort to determine the contours of the bottoms and the algæ *Chara* was brought to the surface from bottoms at about 25 feet deep or less. Shallower lakes have a rich growth of this plant which rises in bulky masses sometimes to the surface. The water birds at Moose lake in mid July were using these off-shore masses as feeding resorts. In a few localities the *Characeæ* appear to be forming the base for the growth of other aquatic plants. In most of the lakes there is an abundant plankton consisting of green and blue-green algæ as well as many minute animal organisms.

A few sink-hole lakes are of such inverted conical form that they have no marginal aquatic vegetation at all. There are several of these near the trail between Moose and Pine lakes, and a few notable examples along the wagon road east of Pine lake. Scarcely any peaty materials have accumulated on their steep bottoms and from the edge one may look down many feet through the clear water. Pioneer plants on less steep shores are usually species of *Potamogeton*. These are rooted in the bottom and by their semi-floating, supple nature are admirably adapted to withstand wave action. Although many observations will be required to prove the point, peaty bottoms appear to favour the broad leaved *P. praelongus*, whereas sandy, gravelly or muddy bottoms grow the narrow leaved *P. vaginatus* or *P. pectinatus*. Both *P. praelongus* and *P. pectinatus* were found in abundance in typical situations at Moose lake. *P. Richardsonii* sometimes found in place of *P. praelongus*. In the second and third weeks of August 1929 the latter species in Moose lake had its leaves broken and decayed while the fruit was ripening its ripe fruits. The floating bladderwort *Utricularia vulgaris* and water-milfoil *Myriophyllum exalbescens* sometimes accompany the pond weeds and *Chara* in peaty ponds and in muskeg ponds they grow with the peat mosses that extend out

[illegible] gently sloping sandy shores that are subject to considerable [illegible] banks have a scant vege[illegible] [illegible] a turf [illegible] Myriophyllum [illegible] Potamogeton Richardsonii and P. [illegible]formis

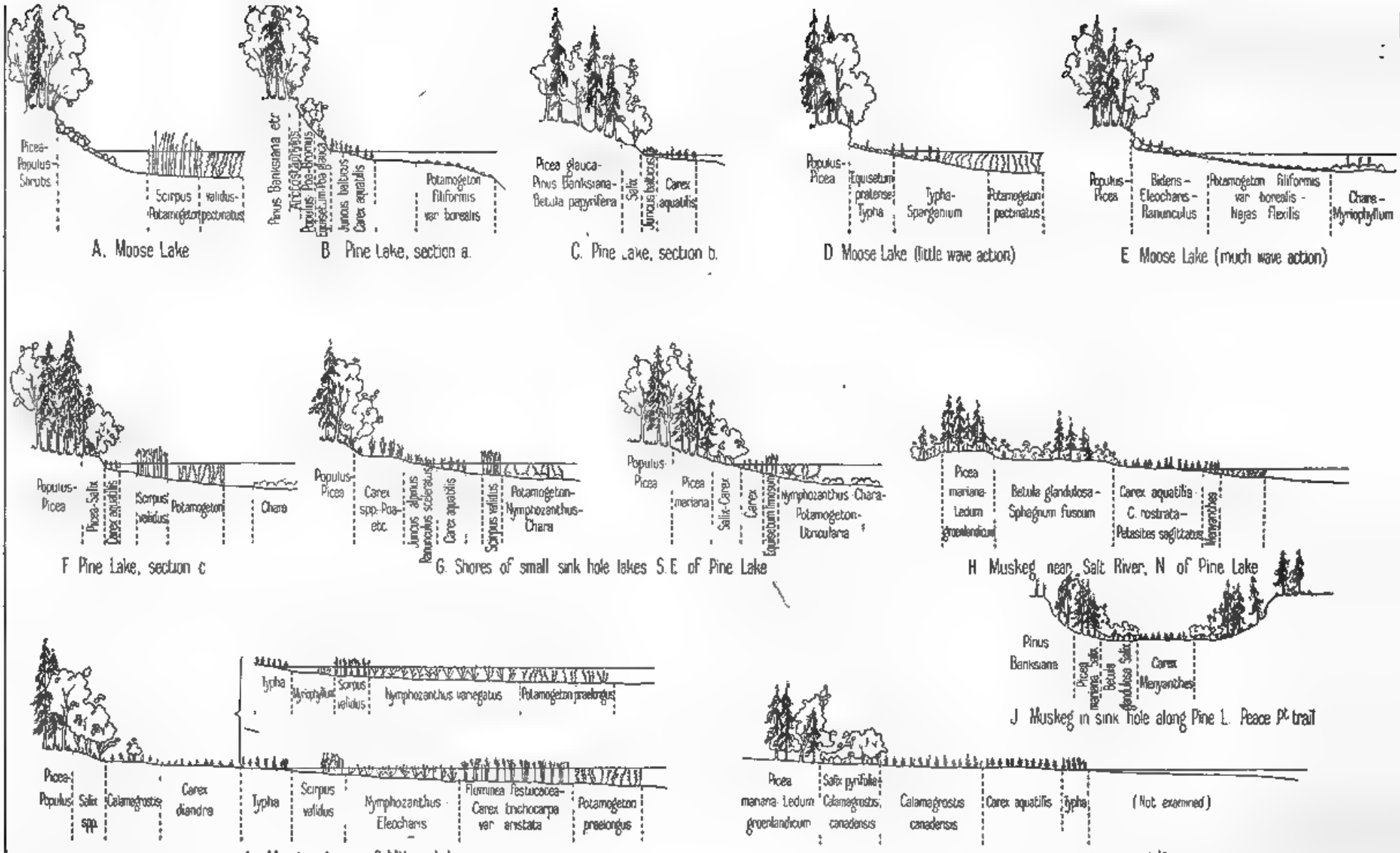
[illegible] steep shores are usually in [illegible] are found in [illegible] 5 or 6 feet deep, [illegible] They are very uniform at [illegible] compare [illegible] Figure [illegible]

[illegible]

[illegible] a part [illegible] In a few [illegible] are [illegible]

[illegible] serves as a place of [illegible] Utricularia [illegible] Potamogeton Richardsonii, P. [illegible] Myriophyllum [illegible] Hypnum spp. [illegible] The [illegible] When the [illegible] rather re[illegible] [illegible] Figure 3 [illegible] Some take [illegible]

[illegible] under water has a very open growth of Myriophyllum, Utricularia, and a few other species but when exposed by drainage [illegible] a sedge marsh aspect.



A. Moose Lake

B Pine Lake, section a.

C. Pine Lake, section b.

D Moose Lake (little wave action)

E Moose Lake (much wave action)

F Pine Lake, section c

G. Shores of small sink hole lakes S.E. of Pine Lake

H Muskeg near Salt River, N of Pine Lake

J Muskeg in sink hole along Pine L. Peace Pt trail

I. Marshy shores of Mitose Lake

K Small Lake at base of Caribou Mts

SHORE-LINE AND WET MEADOW ASSOCIATIONS

On marshy lakes the actual shore-lines are ill-defined but for a description of the vegetation they will be considered as involving the area that is usually being colonized actively by amphibious plants with strongly developed rootstocks.

Sandy, wave-washed shores at Pine lake usually have sedges *Carex aquatilis*, and the baltic rush *Juncus balticus*, occupying the soil for a short distance on either side of the water's edge (Figure 3. B, C) Somewhat similar shores of Moose lake, however, are more muddy and there is an influx of species from the meadow zone described below Very steep, sandy, or stony shores are nearly or quite barren of vegetation at the water-line (Figure 3, A), and at the other extreme is the wet marsh (Figure 3, I) A section at Moose lake will be considered as typical of the latter and described in detail.

The first turf association of the shore is composed of the following species

Primary spp.	*Typha latifolia*
	Carex aquatilis
	C diandra
	Calamagrostis inexpansa var *brevior*
	Eleocharis palustris
Secondary spp	*Potamogeton Richardsonii*
	Bidens cernua
	Galium trifidum
	Rumex maritimus var *fueginus*

Calamagrostis and *Eleocharis* are playing a part in the colonization of the open water only in a few places, and otherwise should be listed as secondary species The other three primary species are commonest in the order of their listing. *Typha* forms dense and often pure stands with its stalks standing in water The sedges and grasses are growing in hummocks and, like *Typha*, are sending out floating or semi-floating masses into the lake Where the masses are more firmly fixed the meadow shore conditions begin. The substratum is of decaying vegetation, and when disturbed it gives off the disagreeable odour of marsh gases The zone is usually a narrow one but when it extends into bays and the lake shore slopes off very gradually it is considerably widened.

Following the pioneer association, *Carex diandra* becomes the predominating plant, forming hummocks It has a large group of semi-aquatic species with it as secondaries.

Rumex occidentalis
Potentilla palustris
Epilobium palustre
Cicuta bulbifera
Stellaria longifolia
Rorippa palustris
Galium trifidum

Sium suave
Scutellaria epilobiifolia
R[illegible] aculeatus
Glyceria pulchella
Carex canescens
C. aquatilis
Rumex maritimus var. *fueginus*

On s[illegible] drier areas occur *Urtica gracilis*, *Potentilla norvegica* var. *hirsuta* [illegible] *Epilobium angustifolium*. The zone is wet and is [illegible] derived from the semi-floating *Typha*-sedge zone.

P[illegible] drier areas back of the *Carex diandra* association have [illegible] dominated by *Calamagrostis inexpansa* var. *brevior*. The g[illegible] associated with the more mesophytic plants of [illegible] seedling *Salix planifolia* and *S. myrtillifolia*, *A[illegible]* *Geum macrophyllum* var. *perincisum*, *Erigeron acris* var. [illegible] *A. hiemalis* [illegible] *A. [illegible]* and *Agrostis scabra*.

T[illegible] the common one on marshy lakes throughout [illegible] the shores differ greatly in width and in the relative pr[illegible] of the associations. There are some minor specific differences [illegible] of *Carex diandra* by *C. aquatilis* or the insertion [illegible] predominating sedge. A treatment of the vegetation [illegible] pond shores where mosses are dominant will be deferred to the [illegible] muskeg vegetations as a whole.

SHRUB ASSOCIATIONS

On the shores of most lakes that have been formed by a more or less [illegible] sink holes the vegetation has no genetic relationship to [illegible] surroundings. The dry pine woods often come nearly to the water's edge. In lakes where there has been a slow but appreciable change in water [illegible] the sandy shores have been worked over and formed into small [illegible] and spits upon which is developing typical sand-plain vegetation [illegible] open jackpine woods. There are several such situations on Pine lake [illegible] Figure 3 B. On marshy shores, however, the upper, more mesophytic parts of the slopes are developing forests by a regular set of stages. The shore section at Moose lake discussed above may be continued to illustrate the transition to timber.

The first association of woody plants is dominated by *Salix planifolia* and *S. myrtillifolia*. Secondary species are as follows:

Calamagrostis canadensis
Alnus incana
Potentilla norvegica var. *hirsuta*
Geum macrophyllum var. *perincisum*
Castilleja Raupii
Achillea Millefolium
Agrostis scabra
Erigeron acris var. *asteroides*

It will be noted that this is a repetition, in part, of the preceding zone as far as the secondary species are concerned.

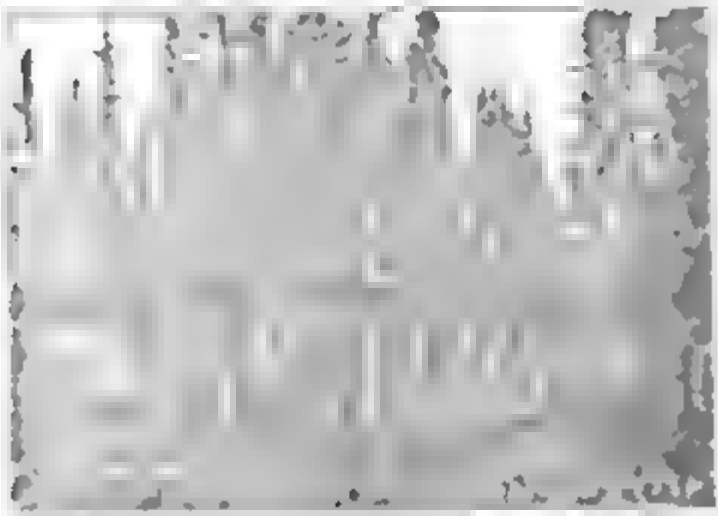
The *Salix* association passes to the spruce forest of the surrounding country through a narrow transition zone involving *Populus tacamahacca* much like that of the river flood plain. In the [illegible] of [illegible] *Populus tremuloides* [illegible] an important part in the arrangement. Where [illegible] low and adjoins the lake the *Salix* association passes directly into *Picea mariana*–*Larix*–*Sphagnum* muskeg and the muskeg forest merges imperceptibly with the *Picea glauca* timber. On the low semi-muskeg shore of a small lake at the base of Caribou mountains *Salix myrtifolia* takes the place of *Salix planifolia*.

MUSKEG VEGETATION

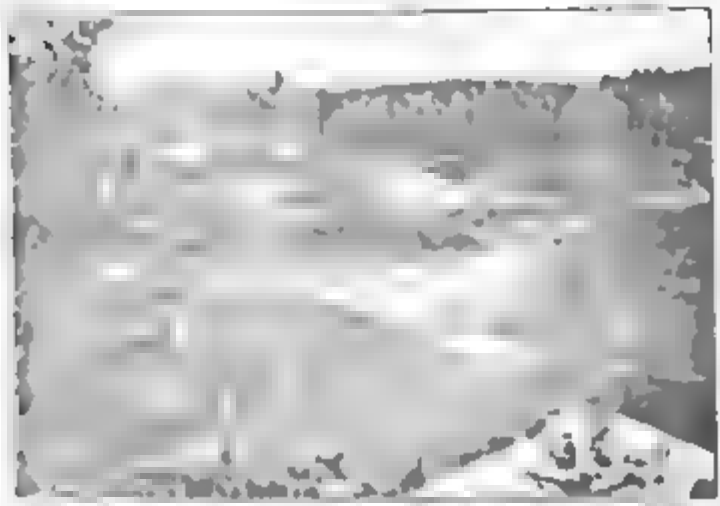
Hundreds of square miles in Wood Buffalo park are covered with muskegs which are readily distinguished from sloughs by the presence of [illegible] in their ground cover. In the early part of the summer season they are wet at the surface but not flooded beneath a foot or two. [illegible] greater depths [illegible] table [illegible] through the country. [illegible] there has not been [illegible] standing water the surface layers begin to dry [illegible] in August so that [illegible] become quite passable in late summer [illegible] autumn. Ponds that persist throughout the year are [illegible]. The largest muskeg areas [illegible] Moose Lake [illegible] for [illegible]. One [illegible] southeastward from the top of the [illegible] Little Buffalo river [illegible] through them [illegible] (16) 8 miles away. [illegible] a few [illegible] the [illegible] that [illegible] the whole [illegible] muskegs and lakes (16). From the surface of Moose lake [illegible] the same view may be had. The contrast between the type of terrain and that farther eastward is shown by the fact that it is possible to travel from Fort Smith [illegible] to Peace point in midsummer with almost no interference from muskegs. They are common on the uplands but are usually small and separated by dry ridges.

Lewis, Dowding and Moss (36) have published excellent descriptions of the muskeg vegetation in the northern forest of central Alberta, where the results of their studies show considerable similarity to the writer's on Wood Buffalo park. The general trend in the development of a mesophytic forest by the filling of a small lake and pond basins described above is greatly modified by the introduction of bog mosses. In some cases (Figure 3, B) these appear at the actual margin of the lake but are more often separated from it by a wet meadow of sedges and other plants of the shore line associations. The mosses are commonly associated with sedges and are being invaded by a hummocky growth of *Sphagnum* with typical muskeg shrubs. The next stage is the growth of a muskeg forest of black spruce and tamarack and the gradual accession of the Canada spruce of the surrounding country. This trend in a more or less complete series may be seen on the shores of muskeg ponds or may have its various later stages occupying whole depressions where the water conditions have ceased to exist.

PLATE VI



sl with black sp
Caribou Mounta n plateau.



Detailed studies have been made by the writer at a muskeg north of Pine lake, at various places on the shores and in the vicinity of Moose lake, and on the shore of a small lake at the base of Caribou mountains (Figure 3, H, J, K).

AQUATIC AND SHORE-LINE ASSOCIATIONS

Mossy shores are typified by a section of the muskeg near Pine lake (Figure 3, H). The open water is being invaded actively by a moss *Hypnum* sp., which fills large areas and is associated with *Utricularia vulgaris*. In this pond there is not much free space left in the centre. The dominant moss, accompanied by *Meesia longiseta*, forms the substratum for the associations that lie between the water and the invading *Sphagnum* hummocks. The more compact mats of moss have a stand of the buck-bean *Menyanthes trifoliata* which was in fruit on July 9, when the survey was made.

A zone of sedges follows that of the buck bean and the moss.

Primary sp.	*Carex aquatilis*
Secondary spp.	*Triglochin maritimum*
	Carex diandra
	Eriophorum spissum
	Stellaria crassifolia
	Potentilla palustris
	Epilobium palustre
	Menyanthes trifoliata
	Utricularia vulgaris
	Galium trifidum
	Hypnum sp.
	Meesia longiseta

The sedge stands in rather close arrangement, and none of the other species is present in any numbers. In a few places this association alternates with another.

Primary spp.	*Carex rostrata*
	Petasites sagittatus
Secondary spp.	*Sparganium minimum*
	Carex aquatilis
	Eriophorum angustifolium
	Potentilla palustris
	Epilobium palustre
	Utricularia vulgaris

The *Carex rostrata-Petasites* association may be distinguished at a distance by its lighter green mixed with the grey-green of the latter plant.

The two associations just described, with minor variations are very common throughout the region. Vast areas of the Moose Lake basin are covered with them to such an extent that overland travel is nearly impossible. Figure 3, J shows them in a muskeg along the Pine Lake-Peace Point trail about 15 miles north of Peace point.

In a muskeg observed in Caribou mountains *Sphagnum* is the moss that has invaded the centre of the pond, where it is associated with a grass-like plant whose identity has not been determined. At the outer margin the moss grows with *Carex paupercula* var. *irrigua*. The latter species accompanies the invading bog shrubs into the depression.

BOG SHRUB ASSOCIATIONS

The manner in which *Sphagnum* invades the sedge associations, or low moors, has been well illustrated by Lewis, Dowding and Moss (37). In the muskeg near Pine lake the association is somewhat as follows:

Primary spp.	*Sphagnum capillaceum*
	Betula glandulosa
Secondary spp.	*Larix laricina*
	Picea mariana
	Carex paupercula var. *irrigua*
	C. aquatilis
	C. capillaris
	C. capitata
	C. pauciflora
	C. limosa
	C. disperma
	C. leptalea
	Eriophorum spissum
	Salix pedicellaris var. *tenuescens*
	Drosera rotundifolia
	Andromeda Polifolia
	Chamaedaphne calyculata
	Vaccinium Oxycoccos

There are many square miles of this boreal muskeg in the park area. The above list is fairly complete for the immediate situation, but is not so when the type as a whole is considered. It is the most noticeable and most stable intermediate stage between the wet bog associations and the developing timber. The elements of the latter may be commonly observed invading the shrubby areas, as the list indicates. The following species have been noted or collected in similar situations in the park.

Equisetum limosum
E. scirpoides
Arctagrostis arundinacea
Calamagrostis canadensis var. *robusta*
C. inexpansa var. *brevior*
Deschampsia caespitosa var. *glauca*
Scirpus hudsonianus
Carex atratiformis
C. vaginata
Eriophorum opacum
Smilacina trifolia
Toficldia glutinosa
Salix candida
S. myrtillifolia

S. athabascensis
Myrica Gale
Betula pumila
Rumex occidentalis
Stellaria longifolia
Chrysosplenium tetrandrum
Potentilla fruticosa
Rubus acaulis
R. Chamaemorus
Ledum groenlandicum
L. palustre var *decumbens*
Lonicera glaucescens
Valeriana sylvatica
Achillea Millefolium
Aster junceus
Erigeron acris var *arcuans*
Petasites vitifolius
Senecio pauperculus

On Caribou mountains the birch association does not appear to be accentuated *Ledum* and *Chamaedaphne* being the pioneer bog shrubs.

TREE ASSOCIATIONS

The first bog forest to invade the wet muskegs is made up chiefly of black spruce *Picea mariana* and Labrador tea *Ledum groenlandicum*. Tamarack *Larix laricina* although quite common, does not take a primary position. The *Sphagnum* is gradually replaced by woodland mosses such as *Hypnum Crista-castrensis* and *H. Schreberi* with an association of typical herbs and shrubs.

Primary spp. *Picea mariana*
Ledum groenlandicum

Secondary spp *Equisetum scirpoides*
E. variegatum
E. sylvaticum var *pauciramosum*
Carex gynocrates
C. vaginata
C. capillaris
C. disperma
C. diandra
Eriophorum opacum
Maianthemum canadense
Orchis rotundifolia
Habenaria obtusata
H. hyperborea
Calypso borealis
Listera borealis
Corallorrhiza trifida
Spiranthes Romanzoffiana
Salix glauca
S. Bebbiana
S. myrtillifolia
S. arbusculoides

Betula papyrifera var *occidentalis*
B glandulosa
Groenlandia densa
Ribes triste
R hudsonianum
R oxyacanthoides
R lacustre
Parnassia multiseta
P montanensis
Mitella nuda
Rubus acaulis
Shepherdia canadensis
Vaccinium Vitis-idaea var *minus*
Arctostaphylos rubra
Pyrola asarifolia
P secunda
P chlorantha
Monesis uniflora
Castilleja Raupii
Linnaea borealis var *americana*
Poliegera aphthosa

The general aspect of the woods does not show an abundance of secondary species, since these are usually much scattered. The spruces make a rather close stand at the actual margins of the birch muskegs, where *Ledum* reaches its greatest abundance, but older woods are more open and the moss carpet is the most prominent feature of the lower strata.

The invasion of certain types of marshy lake shores by the bog forest is shown in Figure 3 b. Instances of this are not regular in occurrence and may be isolated on such shores as that of Moose lake. The writer can see no reason for this sporadic occurrence other than the extremely gradual slope and poor drainage of the land and the usual presence of a typical bog forest immediately back of the lake margin. This is the case in every instance thus far examined. Another problem is that of the elevated portion of the muskeg forest north of Pine lake. The explanation most commonly offered for this phenomenon is the differential burning of peat in the fires that have swept the region. Such may indeed be the case, but in a country like this, where lake and pond levels can be demonstrated to have fluctuated so noticeably in very recent post-Glacial time, much further study is necessary before the determining causes can be found. These elevated peat deposits are not uncommon either in Wood Buffalo park or in other places in the Athabaska-Great Slave Lake region.

A comprehensive study of the muskeg vegetation and peat deposits of the region can be said to be scarcely begun. With the limited time and equipment available the writer has made only a superficial record of general aspects and has not attempted to make borings or to try by any other means to learn the earlier conditions of the muskegs. Such a study would reveal a great deal concerning the post-Glacial and post-lacustrine history of the vegetation.

The bog forest appears to develop directly into Canada spruce woodland. This may be seen near the shores of Moose lake, but it is not com-

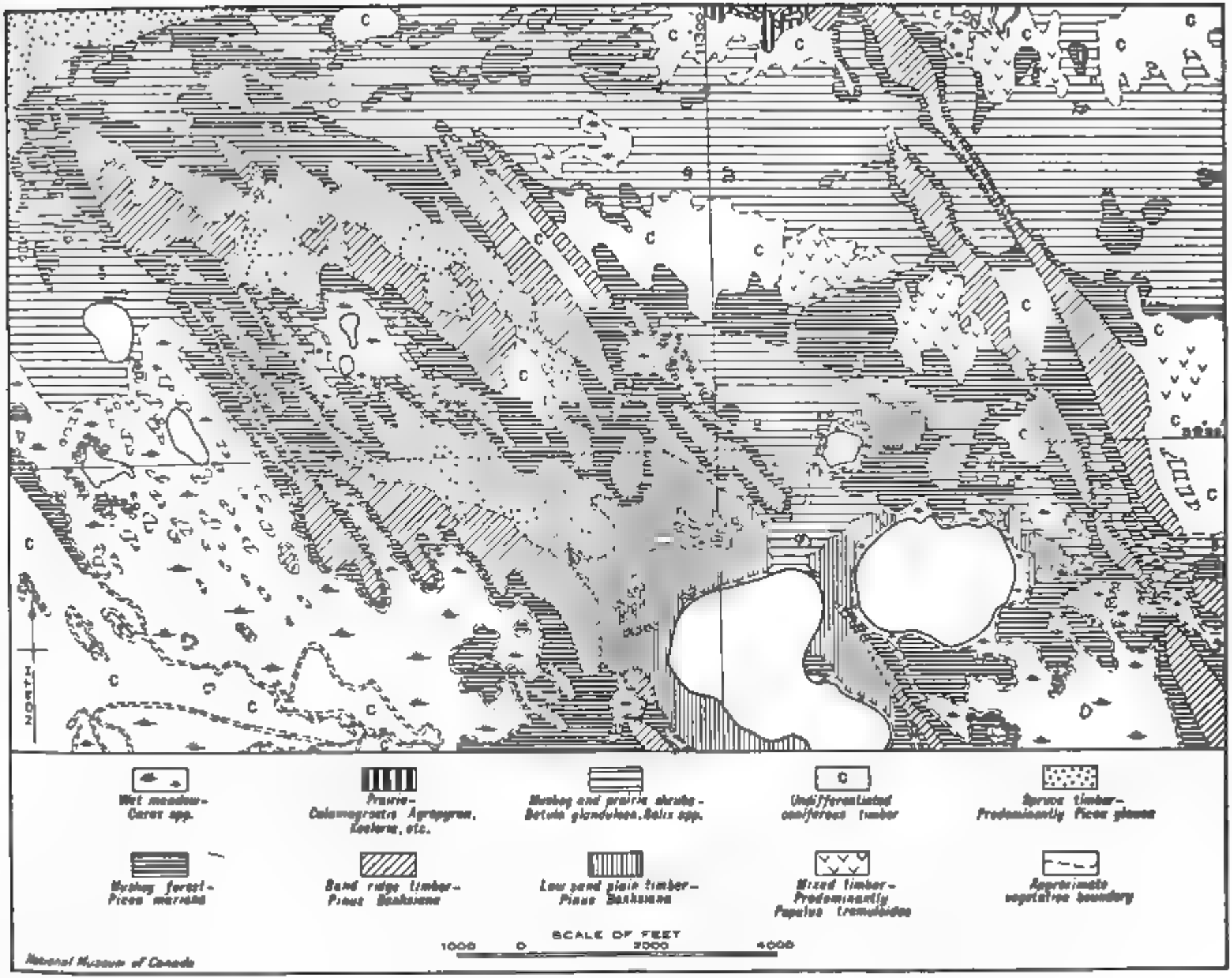


Figure 4. Map of vegetation in an area about 2 miles east of Moose (Eight) lake.

monly apparent throughout the park. Many muskegs are bordered abruptly by sand ridges, where there is no close relationship with the upland vegetation.

Figure 4 is a map of a bit of country a few miles east of Moose (Light) lake showing the general arrangement of the vegetation in the marginal part of Moose Lake basin. The relatively large areas covered by wet meadow and muskeg shrubs, as well as the large amount of surface water, indicate the character of the topography. The ridges on which the jackpine timber are mainly growing are ridges which appear to be superposed upon an older topography consisting of low broad elevations and depressions that have a trend to the west-northwest. This latter trend is in the direction thought to have been followed by the Pleistocene ice in its movement westward, whereas the sand ridges are most probably parts of the great Whate moraine system and of ridges that form the Niobe beach to the northward. Many of the smaller lakes show evidences of lowering water levels, and one of the most interesting features of the region is the presence of low sand plains that have been but recently exposed by this gradual drainage. They have a scattering stand of jackpine on them. Plate VI A, B shows muskegs in the boggy and partly timbered conditions.

SEMI-OPEN PRAIRIE[1] VEGETATION

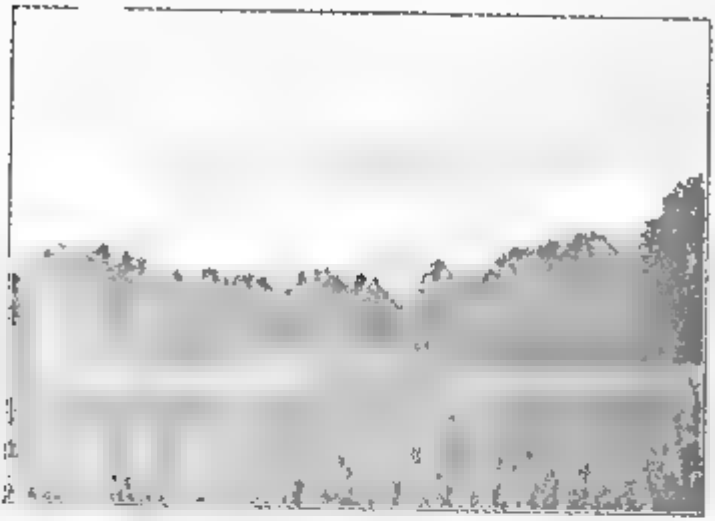
Open areas in the forest, with herbaceous vegetation consisting largely of prairie grasses and other herbs common to open ground, have been described by several travellers who have visited parts of the uplands west of Slave river. Many early explorers, traders, and casual travellers ascended Salt river to the springs at the base of Salt mountain, but very few have contributed anything other than a general description. Camsell, in 1902 (13) and Seton in 1907 (65) visited the upland prairies southwest of Fort Smith and made excellent notes on their extent and condition, and Seibert's map (63) (1922) shows clearly the outline of the semi-open area that lies between Grassy slough and Flatgrass lake. The writer has found no published accounts of the prairies north of Peace river at the base of Caribou mountains.

The wood buffalo have used the prairies as summer feeding grounds from time immemorial (54). Their deep-worn migration trails near Pine lake converge upon the Grassy slough–Flatgrass Lake openings, where the animals make their appearance in spring as soon as the new green shoots of the prairie grasses start growing. The open places, as well as the neighbouring ridges, are dotted with the saucer-like depressions of their wallows. No buffalo were seen at the base of Caribou mountains, nor was there any indication of their presence there for many years, but long-abandoned wallows show that they must have used there before their range was restricted to the area just west of Slave river.

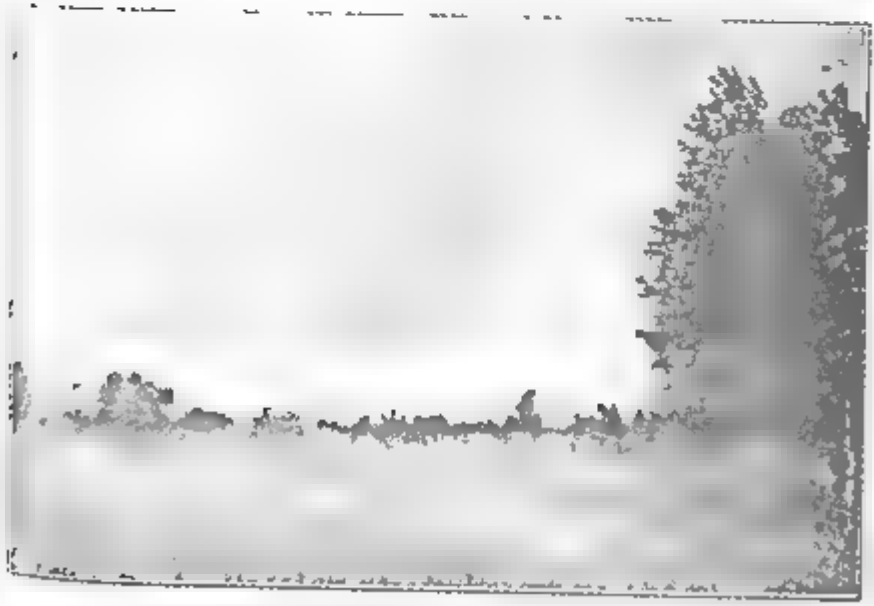
The Roman Catholic Mission at Fort Smith for many years maintained a farm at Salt river in the Salt Plain country. Oats, barley, hardy vegetables, and some wheat were raised successfully, and a herd of cattle sup-

[1] The term "prairie" is here used in a broad sense to include all grassland vegetation in the uplands.

PLATE VII



A. S[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]



B. Sennegon prairie at Peace point. (See Figure 5

[illegible] dairy products and beef to the market. The prairies [illegible] for cutting hay and grazing and [illegible] Salt Plains have long [illegible] among them [illegible] [illegible] [illegible] water that [illegible] met [illegible] Salt Plains [illegible] and [illegible] out [illegible] buffalo [illegible] Peace [illegible] [illegible]. The [illegible] in [illegible] and [illegible] of their own accord [illegible] the Salt Plains. [illegible] in [illegible] [illegible] condition.

[illegible] are best [illegible] of grassy prairie [illegible] at about [illegible] [illegible] and [illegible] at the eastern [illegible] where the prairie extends in a north [illegible] and west [illegible] the park area and [illegible] to extend [illegible] the [illegible] [illegible] Peace [illegible]. The [illegible] [illegible] 25 [illegible] of the Peace that [illegible] [illegible] [illegible] 44. [illegible] [illegible] [illegible] Peace [illegible] [illegible] [illegible] lake near [illegible] between the [illegible] and the Salt Mountain [illegible] long been [illegible] Salt Plains. The extension [illegible] the prevailing area [illegible] region [illegible] a few [illegible] are [illegible] 61, 68, 54. The [illegible] Salt Plains has [illegible] been described.

[illegible] of the prairie vegetation are in openings in the upland forests observed mostly in the vicinity of lake and marsh holes that still have or have had in former times a level that fluctuates greatly.

[illegible] seems best in the following discussion to give more or less detailed [illegible] of the several different types of prairie opening vegetation [illegible] attempting any correlation. Like the upland forests, the initial [illegible] in their history are now lost and there is only the most scanty [illegible] of the causes of their occurrence and the course of their development. [illegible] and poplar [illegible] spruce clumps seem to be encroaching slowly [illegible] the open spaces and appear to have [illegible] within the memory of [illegible] T. [illegible] notes a statement by an old Indian inhabitant that he remembers when the prairies near the Salt Mountain escarpment were [illegible] than they were in 1907 (65). Studies made by the writer in 1930 on [illegible] have not existed for [illegible] the [illegible] [illegible]. There [illegible] [illegible] [illegible] recent development. [illegible] the [illegible] in the aggregate [illegible] small [illegible]. The [illegible] extends to the very base of the [illegible] of the

PLATE VIII

A. [illegible] Raup Camp

B. Salt flats in the Salt Pit near Heart (Raup) Lake.

mountains, and is bounded in other places by muskegs to which it shows scarcely any transition stages. Very few depressions in the upland prairies hold enough water to show what vegetation the lake shore margins would possess. Those observed show a succession of associations that bear some resemblance to that of the river flood-plain sloughs.

The writer's most extensive notes on the prairie openings were made at the eastern base of Caribou mountains in June and July, 1930, and in the Peace Point and Salt Plain districts in July and August, 1928. The openings north of Pine lake were crossed so early in the summer of 1928 (June 15 to 17) that the herbaceous flora was insufficiently developed for study. The recent history of the prairies is so obscure that very little material could be gathered relative to the effects of burning.

PRAIRIES AT THE BASE OF CARIBOU MOUNTAINS

Two localities north of the Indian graveyard, Peace river, were selected as typical. The first of these is about 18, and the second 11, miles from the river. There is a gradual slope in the openings, away from the mountains. Along the trail southward from the 11-mile locality this amounts to approximately 100 feet in 5 miles. The difference in elevation between the two localities was not recorded. The 11 mile district is about 900 feet above sea-level, and about 200 feet above Peace river.

The vegetation at the 18-mile locality is as follows:

Primary spp.	*Poa pratensis*
	Calamagrostis canadensis var *robusta*
	Equisetum sylvaticum var *pauciramosum*
Secondary spp.	*Schizachne purpurascens*
	Hierochloë odorata
	Bromus Pumpellianus
	Carex siccata
	Populus tremuloides (young)
	Salix Bebbiana
	Urtica gracilis
	Arenaria lateriflora (few)
	Stellaria longipes var *laeta*
	S. longifolia
	Thalictrum venulosum
	Delphinium scopulorum var *glaucum*
	Erysimum cheiranthoides
	Descurainia sp.
	Ribes oxyacanthoides
	Fragaria glauca
	Geum strictum
	G. macrophyllum var *perincisum*
	Rubus idaeus var *canadensis*
	Rosa acicularis
	Lathyrus ochroleucus
	Vicia americana
	Epilobium angustifolium
	Mertensia paniculata

Stachys scopulorum
Galium boreale
Achillea Millefolium
Solidago canadensis
Taraxacum dumetorum

The grasses and perennial herbs make a close turf on the rich soil of sandy loam. There is a tangle of grass roots to about 3 or 4 inches below the surface. Under this is a brownish loam to a depth of about 10 inches below the surface. A layer about 7 inches thick beneath this has much the same texture but more of the darkening due to the humus content. The next 7 inches show an increase in the amount of sand. The remainder above frost-line is composed of layers of pure sand crossbedded with clay. In all of these layers are occasional living roots of the shrubs and small trees that occur as secondary species in the plant cover. There is no indication of the former presence of timber.

The most prominent shrub is the gooseberry *Ribes oxyacanthoides*. It was for this that the Indians have named the region the Gooseberry Prairie. Gray's willow *Salix Bebbiana* is the next big representative of the shrub layer of the neighboring poplar and spruce woods and seems to be actively invading the openings. The primary species are not uniform in distribution, the two grasses commonly associating in dominance. The gradual transition to the poplar woods is entered by the appearance of such characteristic species as *Viburnum pauciflorum*, *Shepherdia canadensis*, *Lonicera glaucescens* and *Amelanchier florida*. The poplar in the woods is probably the result of fires as elsewhere in the timbered areas and once set in it has taken the place of spruce as colonizer of the openings. The bottoms of dry creeks contain a somewhat different flora which will be treated in connexion with the Hill-top area where more material from it was collected.

There is a notable difference in the predominating species in the latter locality with the introduction of the sedge *Carex trichocarpa* var *crustata* as a primary species and the reduction of the blue-grass *Poa pratensis* to relative unimportance. The secondary species include all those given in the above list with a few additions that will be given here.

Primary spp	*Calamagrostis canadensis* var *robusta*
	Carex trichocarpa var *crustata*
Secondary spp	*Agropyron trachycaulum* var *unilaterale*
	Koeleria cristata
	Bromus ciliatus
	Carex pratensis
	Potentilla arguta
	Rosa Woodsii
	Heracleum lanatum
	Collomia linearis
	Symphoricarpos occidentalis
	Petasites sagittatus

The primary species were selected because they were found dominating the turf more commonly than others. In a few places nearly pure stands of fireweed *Epilobium angustifolium*, goldenrod *Solidago canadensis*, brome-grass *Bromus Pumpellianus* or wheat-grass *Agropyron trachycaulum* var *unilaterale*, are to be seen covering small areas. *Petasites* is limited to the

wettest places, chiefly near the willow margins. As reference to other parts of this paper will show, *Carex trichocarpa* var. *angulata* is extremely variable in its selection of habitats, for it seems to flourish equally well in the broad marshes of delta plains, in semi-dried flood-plain sloughs, in water 4 feet deep on the shores of marshy lakes, and here in the semi-open prairie where it has to compete with a large number of grasses and other herbs. Its more common wet-shore habitat, however, indicates wetter conditions for the whole growing season in the 11-mile area than in the 18-mile area. Occasional marshy depressions show typical wet-meadow plants such as *Glyceria pulchella* and *Rumex occidentalis*.

One of the most striking features of these prairies is in the colour and appearance of their vegetation. In late June and early July they were tinged blue by the cowslip *Mertensia paniculata*. By the latter part of July this was mostly changed to purple by delphiniums, with dashes of white made by the northern bedstraw *Galium boreale* and yarrow *Achillea Millefolium*, and of yellow made by the mustards and by avens *Geum strictum* and *G. macrophyllum* var. *perincisum*. *Delphinium* was growing abundantly over 5 feet high and one record plant measured 9 feet 3 inches with a portion of its inflorescence still unfolded. Blue-joint grasses, blue-grasses, and fireweeds were growing over 5 feet tall, and the cow-parsnip *Heracleum lanatum* was well over 6 feet.

At the 11-mile area the spruce timber margins the prairie, where it seems to be growing in a virgin state. The transition is marked by clumps of grey willows, and an indefinite mingling of prairie and woodland species. With the appearance of woodland mosses there come wetter conditions than occur at poplar margins. Most of the prairie species are present in reduced numbers, so the list of secondary species given here will be limited to the woodland element in the flora.

Primary spp.	*Salix Bebbiana*
Secondary spp.	*Calamagrostis canadensis* var. *robusta*
	Picea glauca (young saplings)
	Betula papyrifera var. *neoalaskana*
	Arenaria lateriflora
	Ribes hudsonianum
	Fragaria glauca
	Rubus pubescens
	R. acaulis
	Lathyrus ochroleucus
	Cornus stolonifera
	Viburnum pauciflorum
	Solidago multiradiata var. *scopulorum*
	Arnica rhizomata
	Wetter areas
	Carex disperma
	C. vaginata
	Parnassia multiseta
	P. montanensis
	Senecio pauperculus
	Epilobium acme var. *arcuans*

Rosa acicularis and *Symphoricarpos occidentalis*, listed with the prairie flora, show considerable increase in abundance at the willow margins. The young spruce saplings have long, horizontal roots which reach through the new leaf mould beneath the willows. A tree 5 or 6 feet tall will have one

arge root ½ to ¾ nch in diameter at the base and 7 or 8 feet long It never leaves the leaf mould layer and remains mostly about 2 inches below the ground surface These long, pliable roots are easily peeled and split, and have long been used by the Indians as sewing or binding materials for their birch bark utensils and canoes.

Throughout these openings are small stream beds which evidently have had no flow ng water in them for a long period A little moisture may collect in them in the spring but it soon seeps away and leaves them dry There are usua ly a great many large ant hills along the lateral slopes, with a few in the more or less flat bottom The most interesting feature of these dry creeks is the presence in their beds of a quite different assemblage of prairie species, and what seems entirely anomalous it represents a more xerophytic association than the one that grows on the surrounding prairie. Many of its species are drawn from a group that inhabits such relatively dry plains as the river bluff at Peace point. The writer listed forty-one species, sixteen of which (one of them primary) do not occur outside the dry bottoms The remainder are drawn from the immediate surroundings. By following up a creek bed one finds that it gradually shallows and that as it shallows it loses its peculiar flora which is best seen at depths of 3 or 4 feet below the level of the prairie Deeper creeks present semi-marsh conditions. The following list contains only those plants peculiar to this type of terrain. The primary species are easily dominant over the scattered secondaries.

Primary spp	*Carex siccata*
	C obtusata
Secondary spp	*Festuca saximontana* (A)
	Agrostis scabra (A)
	Poa glauca (A)
	Carex abbreviata
	Smilacina stellata
	Cerastium arvense
	Drabа nemorosa (A)
	Geum triflorum
	Potentilla pennsylvanica
	P pulcherrima
	Campanula rotundifolia
	Erigeron glabellus
	Aster laevis var *Geyeri*
	Artemisia dracunculoides (A)

Those marked (A) are commonest on the ant hills, and are among the most xerophytic of the lot The blue-bell *Campanula* was found sparingly in the surrounding prairie, but was abundant in the creek bed *Carex obtusata* a predominant species here, was found elsewhere only on the drier parts of Peace Point prairie This flora was found in both the 11- and the 18-mile areas.

The soil sections at the 18-mile area show increasing permeability with increasing depths Between 24 inches and frost line on June 26, was found a layer of pure sand interbedded with clay On July 6 this was found to continue down to 41 inches in a nearby poplar grove It seems clear that the creeks were once part of a temporary drainage system that carried the run-off from the exposed and rather impermeable bottom of the ancient lake in which these soils were laid The streams continued until the mountain brooks into which they drained had cut deep ravines, and until they

had so dissected the clays that they exposed the more permeable sandy layers beneath. The action of the prairie vegetation increasing the water-holding capacity of the soil and opening the upper layers to seepage together with the facilities presented by the sands for carrying [illegible] a decreased run-off, have entirely eliminated running water and exposed the sandy bottoms as the most xerophytic habitat in the vicinity. The [illegible] and talus a further evidence of the dryness of the soil. The depth to which the permeable layer goes is not known. A creek bed 6 or 8 feet deep was observed to be in a [illegible] condition with wet [illegible] vegetation indicating that in this locality the layer is not a thick one. The same type of topography has been observed in the prairies north of Pine lake and in those near Salt river south of Heart lake.

Although no detailed observations have been made by the writer in the [illegible] Grassy [illegible] district or from their extensions northward, [illegible] given by other travellers indicate that the flora is quite [illegible] (13, 63, 65). Some small prairie openings a short distance north of Pine lake were studied in 1928 and appeared to be [illegible] outliers of the larger ones farther northward. They were much modified [illegible] by bush fires and from being used extensively as buffalo [illegible]. Some [illegible] have scarcely [illegible] and but few elements of [illegible] vegetation and may be the result of long continued [illegible] buffalo. [illegible] jackpine ridges where the trees are being [illegible] off have already been described but further study is needed before [illegible] can be verified. The herbaceous and shrubby species in some of the open spaces are derived almost wholly from the neighbouring woods.

PRAIRIES AT PEACE POINT

As the trail approaches Peace point from the north it leaves the last sand ridges at about 5 or 6 miles north of the river and descends to the present water level by three bluffs or escarpments. The uppermost one is not prominent but is said to be more so farther to the eastward. The middle one, about 50 feet high, is abrupt and subtends the present [illegible] point, appearing at the bank of the river above and below. The sketch map (Figure 8) shows the general topography of the area. The third bluff is at the present bank of Peace river where it is formed of a broken cliff of gypsiferous limestone that stands about 50 feet above the stream. The prairie openings are on the plain of the top of the third bluff, where their distribution is shown by the map. The vegetation on the upper levels is composed of [illegible] clumps mainly *Salix Bebbiana*, scattered stands of aspen, and local muskegs.

The soil of the prairie is a clayey loam about 2 feet deep, with some [illegible] boulders in it. The upper part is black from humus materials shading off so that the lower third is reddish brown. The upper part is [illegible] with a [illegible] of roots, mainly those of grasses. In a recently [illegible] sink hole about 6 feet deep, the lower 4 feet was [illegible] horizontal layers of soft [illegible] broken gypsiferous limestone. Sink holes are abundant throughout, some with water and slough vegetation in them and some quite dry.

The herbaceous associations of the prairie fall rather definitely into two types that appear to be caused by greater or less desiccation of the

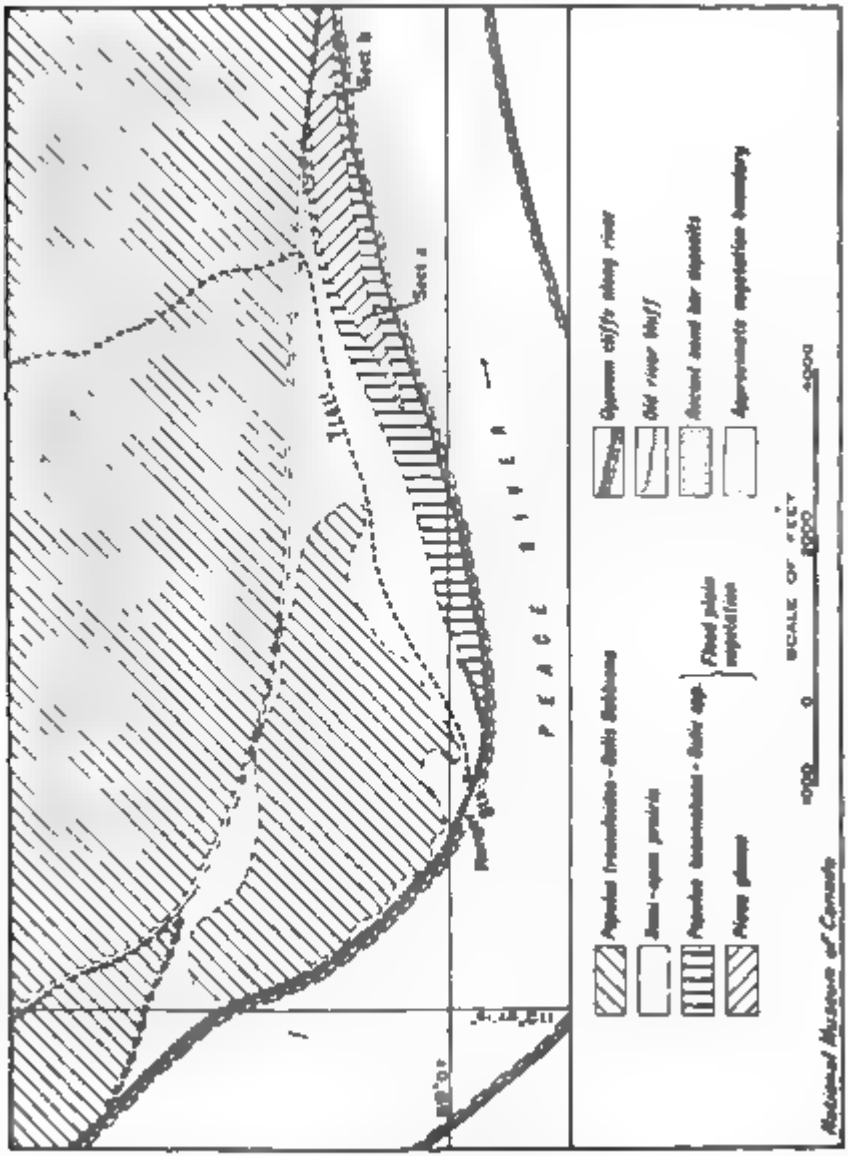


Figure 1. Map of vegetation in Peace River district.

soils. The more xerophytic of these, of which *Stipa comata*, *Avena Hookeri*, and *Koeleria cristata* are characteristic or dominant species, is limited to the wind-swept, well-drained margin of the bluff that is just above the

present river, and to the dry top of the second bluff. It is variable in its floristic content, but the following species are commonly found in it.

Primary spp..	*Stipa comata*
	Koeleria cristata
Secondary spp.	*Elymus innovatus*
	Agropyron trachycaulum var *unilaterale*
	A trachycaulum var *typicum*
	A Smithii var *molle*
	Hierochloë odorata
	Poa pratensis
	P glauca
	Danthonia intermedia
	Carex obtusata
	Smilacina stellata
	Comandra pallida
	Stellaria longipes var *laeta*
	Lychnis Drummondii
	Pulsatilla ludoviciana
	Anemone cylindrica
	Thalictrum venulosum
	Arabis hirsuta
	A retrofracta
	Erysimum parviflorum
	Geum triflorum
	Potentilla pennsylvanica
	Vicia americana
	Oxytropis splendens
	Hedysarum alpinum var *americanum*
	Astragalus adsurgens
	A tenellus
	Elaeagnus argentea
	Arctostaphylos Uva-ursi
	Stachys scopulorum
	Galium boreale
	Campanula rotundifolia
	Achillea Millefolium
	Artemisia dracunculoides
	A frigida
	Erigeron glabellus
	Aster ericoides

In less dry areas there is an association dominated by the wheat-grass *Agropyron trachycaulum* var *unilaterale*, and by an assemblage of perennial herbs of which *Geum triflorum*, *Stachys scopulorum*, *Geum macrophyllum* var *perincisum*, and *Galium boreale* are the most prominent. Most of the secondary species are common to the drier places, so that only those that are characteristic will be listed below

Secondary spp.	*Equisetum pratense*
	Bromus Pumpellianus
	Schizachne purpurascens
	Calamagrostis inexpansa var. *brevior*
	C montanensis
	Sisyrinchium angustifolium
	Anemone multifida var *hudsoniana*
	Rosa acicularis
	Lathyrus ochroleucus
	Monarda mollis var *menthaefolia*
	Symphoricarpos occidentalis
	Aster Ludlegyanus
	Cirsium Drummondii
	Antennaria nitida

In its zones of contact with neighbouring woods the prairie is closely [illegible] by a group of shrubs that make a dense tangle over large patches.

Primary spp.: [illegible]
[illegible]
[illegible]
Salix Bebbiana (in clumps)

The [illegible] species [illegible] from the more mesophytic types [illegible] as [illegible] aspens from the woods farther back from the river.

The [illegible] to the woods is [illegible] by the [illegible] and the presence of a few [illegible] species [illegible] and the [illegible] herbs [illegible]. The [illegible] the [illegible] to the [illegible] much greater [illegible] in the shrub zone [illegible].

T[illegible] pre[illegible] has taken down [illegible] species are [illegible]. [illegible] found on the prairie [illegible] whereas the [illegible] margin [illegible]. The under[illegible] through an [illegible] of the under[illegible]. [illegible] the top and covered [illegible]. [illegible] has [illegible]. It has scattered [illegible] and herbs from [illegible] associations in which [illegible] and [illegible] species. They have with them [illegible] of the prairie.

The [illegible] side of the point have been forming [illegible] channel. The topography and vegetation of these bars [illegible] are shown in Figure 31 [illegible]. [illegible] the oldest bars and the [illegible] vegetation of the adjacent prairie is striking (Figure 5) and raises the question of the possible origin of the prairie [illegible] conditions of [illegible] hardly [illegible] of [illegible]. It exposure to winds of the [illegible] were high and then the prairie could not be [illegible] by the timber. There remain only [illegible] and moisture factors. The prairie stands at about 750 feet above sea level and is probably growing on a portion of the bottom

of the post-Glacial lake that stood at about the 800-foot level. Consequently it may be correlated in age and origin with the Salt Plain prairies. At the withdrawal of the lake the clay deposits on its bottom must have supported a growth of low stature that was either similar to the present one or has developed into it. It has persisted longest on the river side of the plain being cornered from the northwest by willows and aspens and shut away from the river below the present site of the ranger station by the development of a flood plain forest on river deposited soils.

A few sink holes in the [illegible] have fluctuating but constant water supplies. Local inhabitants state that the water levels change with the seasonal changes in the river but this was not verified. Typical wet meadow and shore marsh vegetation are developed consisting of *Carex rostrata*, *Beckmannia*, *Syzygachne*, and *Agropyron pauciflorum*, and a common association on the drier margins consists of *Hordeum jubatum* and *Potentilla Anserina*. A shrub zone with *Salix Bebbiana* and *Symphoricarpos occidentalis* as primary species separates the sloughs from the surrounding prairies or aspen woods.

THE SALT PLAIN PRAIRIES

The greatest extent of open prairies in the park is on the Salt Plain, the name used in this paper to designate the level country lying just west of Slave river. Its boundaries have already been defined or approximated and its general features described in another section so they will not be discussed at length here. The plain is regarded as part of the bottom of what has been called the 800-foot post-Glacial lake, the clay soils being lacustrine deposits in this lake. As indicated elsewhere it is broken by a few morainic ridges, the exact positions of which have not all been mapped. The most prominent of these lies in a broad arc extending eastward from the vicinity of Heart Range lake. The aerial photographs show clearly the positions of the ridge, which is composed largely of sand, and also the topography of the neighbouring salt plains to the northeast of it. These have broad shallow depressions separated by minor ridges that are more or less parallel to the main one.

It is thought by the writer that this ridge, as well as the lesser ones northeast of it, is a member of the lobate morainic system of which the Nyarling hills and the tangle of ridges to the south and southeast of them form the terminus. With the recession of the glacier from the terminal moraine the waters of the 1,000-foot lake were lowered as far as the passes in the moraine would permit. Then a series of lower lakes was formed as the ice front receded to the northeastward. One of these seems to have occupied part of the country southwest of the Salt Mountain escarpment and to have accumulated as bottom deposits such clayey materials as occur in the Grassy Slough district. Another, or an eastward extension of the same one, was probably formed in the part of the Salt Plain which lies southwest of the ridge above described. The recession of the ice from the latter [illegible] morainic [illegible] may have left all these [illegible] the bottom [illegible] may have maintained the lakes and [illegible] new [illegible] the northeast and north [illegible] recently formed soils [illegible] found. From these notes it [illegible] that instead of a single lake [illegible] at about 800 feet, there may have been two or three lakes whose levels ranged in the vicinity of 800 and 900 feet. These

conclusions are, however based upon too few data to be regarded as anything more than working hypotheses.

The vegetation of the plain is modified profoundly by the salt springs that water parts of its surface. Where the soil surfaces have not had sufficient gradient to enable drainage lines to become established, shallow settling basins have collected thin deposits of saline materials from the spring outwash. In other places streams have carried off the outwash, leaving the surrounding soils with little or no salt. Thus there are two well-defined types of herbaceous vegetation on the plains: the first consisting largely of halophytic species, and the second of prairie species in an aggregate that somewhat resembles that of Peace point.

The writer has made detailed studies (1928) at points about 16 miles southwest of Fitzgerald, in the vicinity of Heart lake, with additional notes along routes from this area to the Government Hay Camp and to Fitzgerald. The Salt Plains were crossed in 1929 between Salt River settlement and Little Buffalo river, and along the wagon road between Pine lake and Slave river. Figure 6 is a map made from aerial photographs in the vicinity of Heart lake. It is supplemented with diagrams of vegetational details (Figure 7).

Figure 7 shows a section of a dry watercourse and neighbouring prairie about 2 miles south of Heart lake. The creek probably has a spring flow where it enters Salt river a short distance below this point. The bottom of the creek bed has an open salt marsh vegetation which will be described later in connexion with the other halophytic types. The prairie is dominated by grasses that make a close turf. The area is nearly level and was very dry when the notes were made on August 20.

Primary spp.	*Agropyron trachycaulum* var *unilaterale*
	Koeleria cristata
Secondary spp.	*Juniperus horizontalis*
	Hierochloë odorata
	Deschampsia caespitosa var *glauca*
	Danthonia intermedia
	Schizachne purpurascens
	Agrostis scabra
	Populus tremuloides (saplings)
	Cerastium arvense
	Thalictrum venulosum
	Erysimum cheiranthoides
	E. parviflorum
	Ribes oxyacanthoides
	Geum triflorum
	Potentilla arguta
	P. Anserina
	Fragaria glauca
	Rosa acicularis (few)
	Vicia americana
	Oxytropis splendens
	Linum Lewisii
	Galium boreale
	Symphoricarpos occidentalis
	Achillea Millefolium
	Aster Lindleyanus

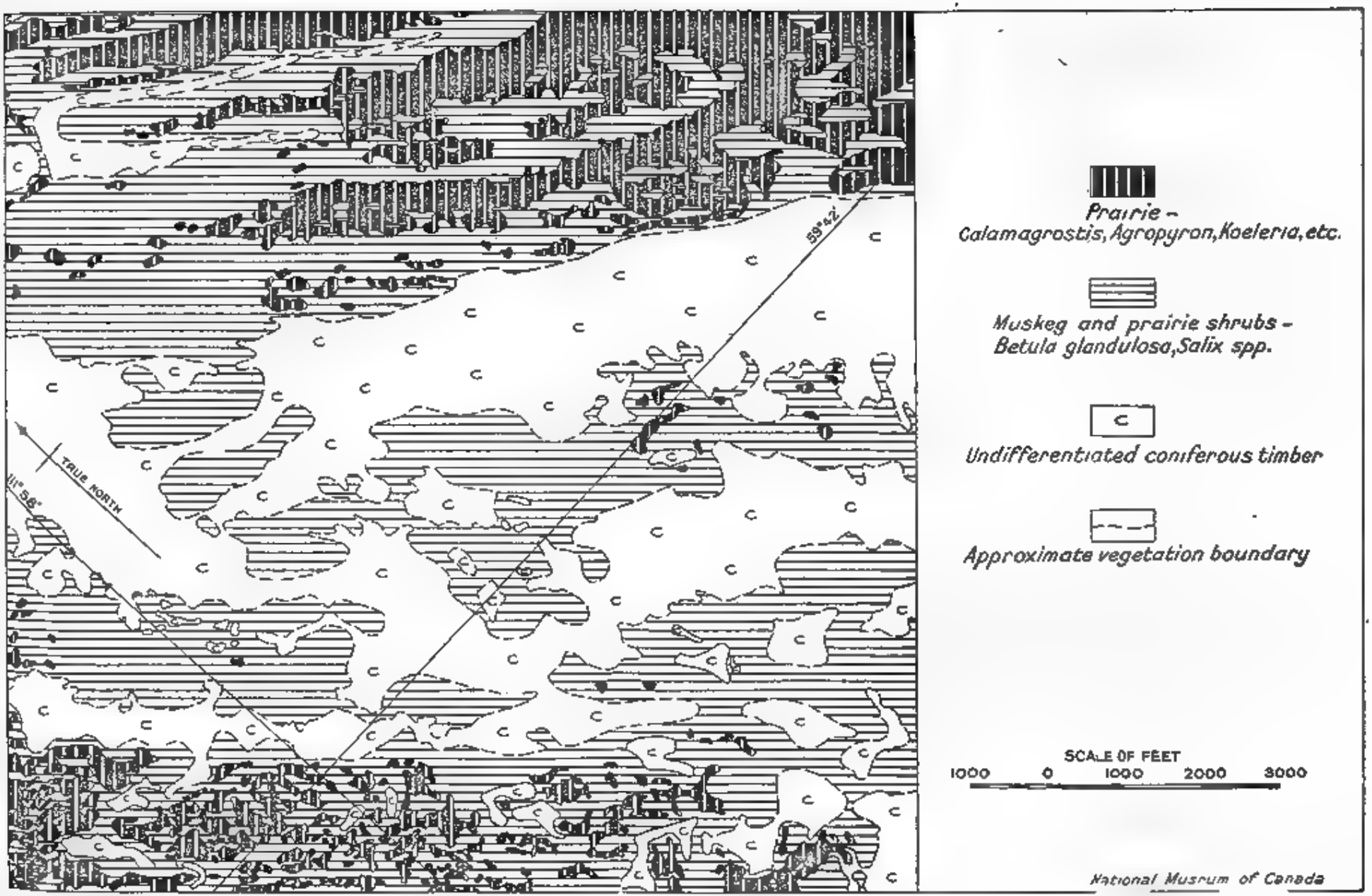


Figure 6. Map of semi-open prairie vegetation near Heart (Raup) lake.

The presence of *Rosa*, *Symphoricarpos* and *Populus* indicates the trend toward mesophytism. The [illegible] here as elsewhere on the [illegible] and seem [illegible] upon [illegible] the surrounding land [illegible]. [illegible] Plains [illegible] of [illegible] is at once striking.

The most characteristic feature of the Salt Plains is the salt marsh vegetation [illegible]. When the [illegible] in the spring [illegible] water that [illegible] August [illegible]. The result of the temporary marsh [illegible] and the centre of the [illegible] the water concentrates the salt in such a way that [illegible] in the centres which [illegible] are quite bare of vegetation. Naturally [illegible] near the salt [illegible] the [illegible]. Between the Mission Farm and [illegible] of acres of flats [illegible] vegetation [illegible] a few feet [illegible] halophytic flora and [illegible]. The [illegible] of the flats are much cracked and [illegible].

A [illegible] section of the [illegible] vegetation is given in Figure 7. The [illegible] the same [illegible] of course with the [illegible] of the [illegible]. At the edge of the latter [illegible] growth [illegible] *Triglochin maritimum*, *Chenopodium rubrum* and *Distichlis stricta*. The [illegible]. Along the muddy margins of salt streams [illegible] the flora is largely made up of *Triglochin maritimum* [illegible] and [illegible].

One of the most prominent associations in the late summer is just outside that of [illegible] and is dominated by wild barley *Hordeum jubatum*. It is readily distinguished at a distance by the reddish to straw-coloured waving heads of the grass. The area seems to indicate a change toward more mesophytic conditions wherein some of the halophytic types disappear and more distinct mesophytes come in. Secondary species are *Triglochin maritimum*, *Calamagrostis inexpansa* var. *brevior*, *Deschampsia caespitosa* var. *glauca*, *Atriplex patula* and var. *hastata*, *Glaux maritima*, *Aster pauciflorus* and *A. ericoides*.

By far the largest herbaceous areas are covered by a close turf made of the baltic rush (*Juncus balticus*) and blue joint grass (*Calamagrostis* [illegible]). [illegible] of these species [illegible] fruiting [illegible] of the [illegible] seem to depend [illegible] upon vegetative [illegible] propagation. The *Juncus* is [illegible] eaten by stock. In a few places *Plantago* [illegible] takes a primary position in the [illegible]

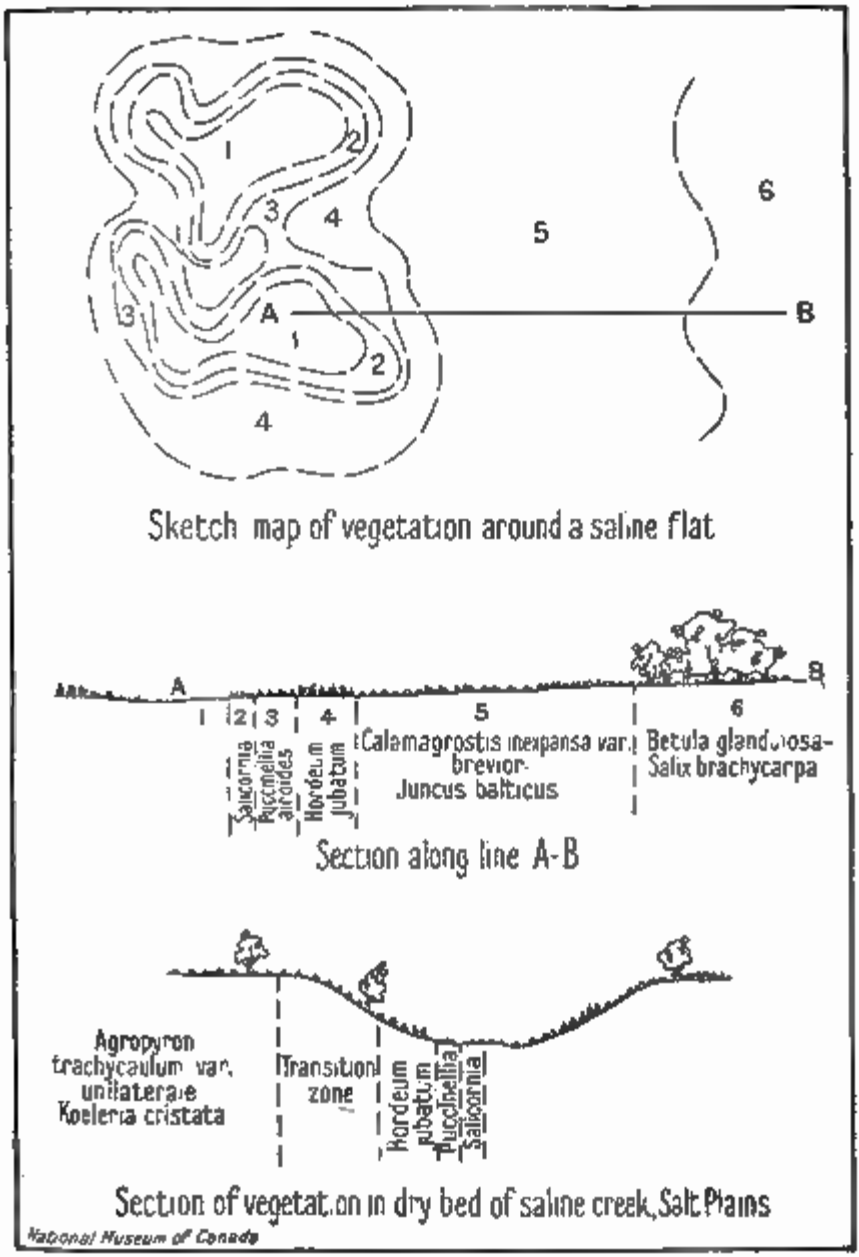


Figure 7 Diagrams of vegetation on the Salt Plains near Heart (Raup) lake.

Some of the secondary species are characteristic, others show relationships to neighbouring bush or prairie flora. There is a general mixture of halophytic and freshwater prairie types.

Secondary spp
Juniperus horizontalis
Triglochin maritimum
Agropyron trachycaulum var *typicum*
Spartina gracilis
Carex Buxbaumii
Smilacina stellata
Allium Schoenoprasum
Hedysarum alpinum var *americanum*
Epilobium palustre
Primula incana
Dodecatheon pauciflorum
Gentiana elegans
Lomatogonium rotatum
Plantago eriopoda
Galium boreale
Achillea Millefolium
Aster junceus
A. ericoides
Solidago canadensis
S. oreophila
Antennaria rosea
Grindelia perennis
Artemisia canadensis
A. biennis

The dry bed of the small creek already described (Figure 7) shows the main elements of the salt flat margin associations. They are greatly condensed, however, and somewhat telescoped. The steep terrace shows a transition to the prairie involving some of the halophytes of the bottom and the more xerophytic species from the prairie.

Clumps of willows and dwarf birches are slowly invading the prairies from the low ridges that separate the depressions and which, if high enough, have spruce and aspen timber on them. Both primary and secondary species in the advancing shrub association indicate a semi-muskeg type of vegetation.

Primary spp.
Betula glandulosa
Salix brachycarpa var *antimima*

Secondary spp.
Picea glauca (small saplings)
Calamagrostis inexpansa var *brevior*
Juncus balticus
Salix candida
S. glauca
S. MacCalliana
Parnassia multiseta
Rosa acicularis
Shepherdia canadensis
Petasites sagittatus

With such a changeable supply of brine in the salt flat depressions it is only natural that there should be all gradations between the above type of marginal arrangement and that in a freshwater wet meadow. Somewhat less alkaline situations with barren or wet depressions support an association of *Atriplex patula* var *hastata*, *Ranunculus cymbalaria* and *Hippuris vulgaris*. The *Atriplex* is the most abundant species. This association

passes to one dominated by the tall grass *Fluminea festucacea* with which occur *Rorippa palustris* var. *hispida*, *Rumex maritimus* var. *fueginus*, and *Sium suave*. The *Fluminea* association is narrow and soon gives way to the broad *Juncus* and *Calamagrostis* association. Where there is standing water in the depressions there is a growth of *Scirpus validus*.

A still drier type of depression is indicated at its margin by an association of *Typha latifolia*, *Atriplex patula* var. *hastata* and *Triglochin maritimum* of which the first is the most abundant. The *Typha* may be at the edge of the water or standing in the water. In very wet areas *Atriplex* is replaced by the somewhat *Ranunculus sceleratus*(?). Between the *Typha* zone and the *Juncus* and *Calamagrostis* association of the prairie there is a narrow zone of *Eleocharis palustris* accompanied by *Triglochin maritimum*, *Calamagrostis canadensis* and *Atriplex patula* var. *hastata*.

SINK HOLE MEADOWS

A highly developed and as yet uninvestigated system of underground drainage in the upland areas of Wood Buffalo park has led to a type of sink hole structure which is notable for its varying water levels. As stated elsewhere completely drained holes have a vegetation that does not differ materially from that of the surrounding country, whereas very flooded holes develop muskegs at their margins. In a third kind there is unmistakable evidence of the rise and fall of water levels amounting to as much as 50 or 100 feet. The slopes are nearly all of sand, and range from very steep grades of unstable materials to gentle ones covered with a turf. Many of the depressions are very irregular in shape being made up by the coalescence of several holes in the vicinity. In such a one from which the writer made collections in August 1929, there were terraces on the slopes and a small stream running through to the deepest hole. The formation indicates that the original series of large holes was later deepened by the falling of smaller holes within it and by the erosion of the former bottom. Figure 8 shows the arrangement of the topography at this place which is along the Moose Lake-Pine Lake trail about 16 miles from the former. Small streams flowing from a lake just south of the hole have supplied the water that has done the eroding of the deep gullies in the old bottoms. Beaver dams at the upper margins of the hole where the streams enter have undoubtedly modified the rate of flow and erosion to a certain extent.

The steepest slopes, both of the newest depressions and of the older ones at higher levels, have a flora that depends upon the mobility of the sandy soil. Where it is loosely sliding it is being colonized by such plants as *Equisetum arvense*, *Veronica peregrina* var. *xalapensis* and *Artemisia canadensis*. On more stable slopes are *Hordeum jubatum*, *Potentilla norvegica* var. *hirsuta*, *Stachys scopulorum*, *Chenopodium album*, *Plantago major* var. *asiatica*, *Thalictrum venulosum* and *Geum macrophyllum* var. *perincisum*. On the newer slopes this association is a very open one but it is much intensified on the old slopes of the original holes.

The flora of the highest terrace, which appears to be the bottom of the older hole, has the most consistent type of vegetation for this kind of situation. It is very common throughout the region and was studied to a

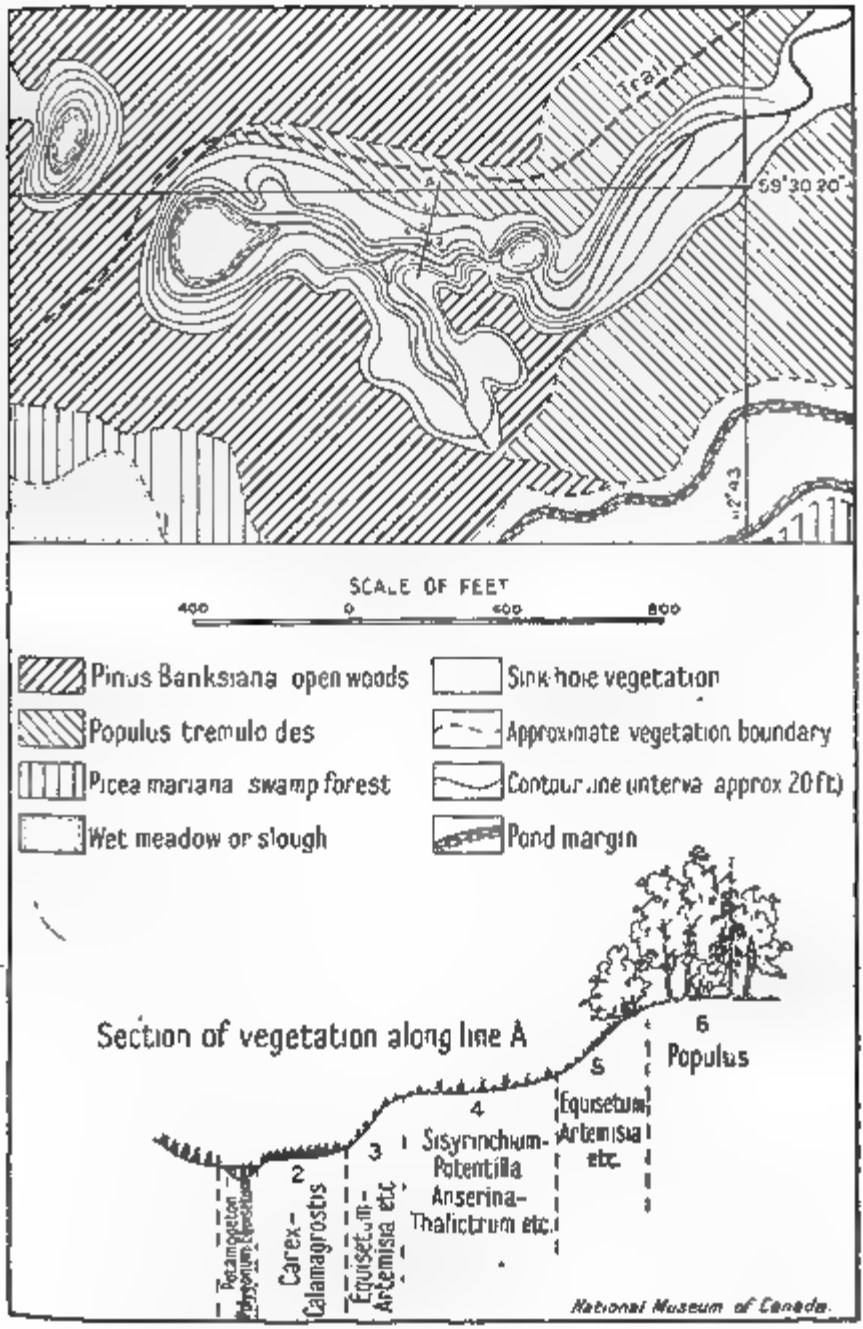


Figure 8. Vegetation of a sink-hole area, 16 miles east of Moose (Eight) lake.

certain extent at a place called Round Lake, about 20 miles north of Peace point in the summer of 1928. Characteristic species are *Potentilla Anserina*, *Sisyrinchium angustifolium*, *Oxytropis splendens*, *Potentilla norvegica* var. *hirsuta*, *Agrostis scabra*, *Arenaria dawsoniana*, *Anemone canadensis*, *Thalictrum venulosum*, *Agropyron trachycaulum* var. *typicum* and *Equisetum pratense*. In many of its elements this association resembles the prairies above described.

The wet levels have a somewhat different type of vegetation whose principal species are *Carex rostrata* and *Calamagrostis inexpansa* var. *brevior*. The prairie aspect is maintained but the substratum is more moist and bears a rich growth of the above species. Notable associates of these are *Phleum arundinaceum* and *Gentiana elegans*. If this area were drained more completely it would probably acquire a vegetation similar to that of the higher levels.

The wet margin of the small stream have an association of *Carex rostrata*, *Equisetum limosum*, *Eriocaulon articulare*, *E. palustre* and *Juncus nodosus*. Accompanying species include *Scirpus subterminalis* and *Glyceria borealis*. In the quieter pools are *Potamogeton Richardsonii*, *Polygonum natans* f. *Hartwrightii*, *Sparganium* sp. and *Equisetum limosum*. Where the water is too deep for larger pools there is a more extensive association of aquatic species with *Potamogeton Richardsonii* most abundant. Other species found there are *Potamogeton heterophyllus*, *P. gramineus*, *P. natans*, *Sagittaria cuneata*, *Hippuris vulgaris* and various algae. *Hippuris* grows in the shallow water or very wet sand at the margin of the pond as does also *Sagittaria*. Dry stream and pool bottoms such as occur in other parts of the depression have a semi-prairie vegetation like their surroundings.

The transition from the sink-hole vegetation to the adjacent timber is a sharp one. A small shrubby growth of *Rosa arcularis*, *Symphoricarpos occidentalis* and other shrubs of the upland woods marks the border.

SUMMARY OF PRAIRIE VEGETATION[1]

The foregoing discussion shows two major types of prairie-opening vegetation the distribution of which seems to be directly correlated with the water holding capacity of the soils. They are largely confined to regions in which the soil has a considerable percentage of clayey materials, and in which the post-Glacial lakes had their settling basins. Heavier soils have a turf dominated by blue-joint grass (*Calamagrostis canadensis* var. *robusta*), the sedge *Carex trichocarpa* var. *aristata*, blue grass *Poa pratensis*, or combinations of these with a variety of other perennial herbs. Lighter soils are dominated by more xerophytic grasses and sedges, of which *Agropyron trachycaulum* var. *unilaterale*, *Stipa comata*, *Carex siccata* or *C. obtusata*, *Koeleria cristata* are the most abundant. The commonest variation from these types is caused by local salt deposits from brine springs, which introduce a halophytic element.

As there is no evidence of an earlier, forested condition the grasslands or possibly tundra forebears of them must have persisted as a type of

[1] A more complete summary of the problem of the northern prairies will be found in the author's discussion of the Peace River grasslands (26).

[illegible] from their inception. This eliminates fires and other secondary [illegible] as causes for their existence, and pushes their history back [illegible] origin and exposure of the [illegible]. The exposure of the ground [illegible] the [illegible] of the [illegible] range of the [illegible] area [illegible] that grass [illegible] formerly covered [illegible] of [illegible] beginning only after the [illegible] stages of [illegible] Present [illegible] knowledge of the region [illegible] long ago [illegible] The [illegible] indicates that [illegible] and [illegible] similar [illegible] shows that the [illegible] of the [illegible] The [illegible] of decay [illegible] change has been emphasized [illegible] These things render [illegible] changes [illegible] much slower than they are in more southern regions, so that [illegible] with post-Pleistocene vegetations in other regions seem quite impossible.

[illegible] stages of the prairies were probably not hydrophytic except [illegible] There was sufficient [illegible] slope to [illegible] must have been [illegible] There seems no reason [illegible] the sandy [illegible] in other parts of [illegible] to live at the [illegible] sub-arctic plains of northern [illegible] that it could very [illegible] have [illegible] vegetation [illegible] preceded only by a lichen mat of [illegible] already described have [illegible] forest. There is almost no humus in the [illegible] grass and vegetation.

[illegible] known of the complete history of the area that it is impossible [illegible] any other than the most general idea of the course of events. [illegible] There is no evidence [illegible] of any other [illegible] than gradual [illegible]. The [illegible] eastward from the Great Plains region [illegible] on the basis of a warm dry period which no longer [illegible] but it seems necessary at present to [illegible] the period [illegible] It [illegible] that they were effective in modifying the essential character of [illegible] which must have remained treeless and which [illegible] probably covered with grasses or some kind of tundra that did not form much peat.

[illegible] study of the arctic prairie north of the tree line should throw [illegible] light upon the history of all sub-arctic grasslands.

VEGETATION OF THE PEACE-ATHABASKA DELTA REGION

Description of the Area

Wood Buffalo park embraces the [illegible] greater part of the vast delta deposits of Athabaska, Birch, and Peace rivers. These marshy lowlands lie around the west end of lake Athabaska and include the shallow depressions in [illegible] known as Deep lake [illegible] water. Although no contour lines [illegible] and surveys and [illegible] near the 750-foot [illegible] 24, 12 [illegible] the northern base of Birch [illegible] at Bea[illegible] near [illegible] 112, 65 [illegible] Peace [illegible] near [illegible] 1, 2 [illegible] Precambrian plateau [illegible] southeast of the Athabaska [illegible] are to be found in the lower valleys of the Athabaska, Peace, and Birch and along upper Slave river.

[illegible] earlier [illegible] region have already been mentioned [illegible] which are by F. M. Kindle (33), J. Macoun (40, 41) and [illegible] (47). That of Macoun contains excellent notes on the vegetation.

[illegible] basin of lakes Claire and Mamawi contains three main [illegible] Athabaska and Peace rivers being the largest and entering from the southeast and north, respectively. Birch river deposits [illegible] or not [illegible] stable [illegible] the Peace causes the current in [illegible] the Quatre Fourches [illegible] and Rocher to change [illegible] whether the Peace is in flood or not. The channels [illegible] that are at present most important in the filling of the Lake Claire-Lake Mamawi basin are the Embarras from the Athabaska and the Quatre Fourches from the Peace.

The only relief in the plain is afforded by granite outliers of the Precambrian rocks to the eastward. These are rounded hills standing like islands in the flats, for the most part having very little soil on them, and disappearing a short distance west of the Quatre Fourches. They decrease in height to the westward, those on the eastern shore of lake Mamawi being only a [illegible] feet above the general level. The lakes, although of large area, average [illegible] 4 [illegible] 5 feet in depth. As a rule their shores are very marshy, but in [illegible] where they are exposed to the action of storm waves they are cut back and comparatively dry. The abandoned channels of the streams, and the ponds formed by the cutting off of [illegible] of the lakes are in all stages of filling [illegible] being [illegible] toward the [illegible] margins of the basin.

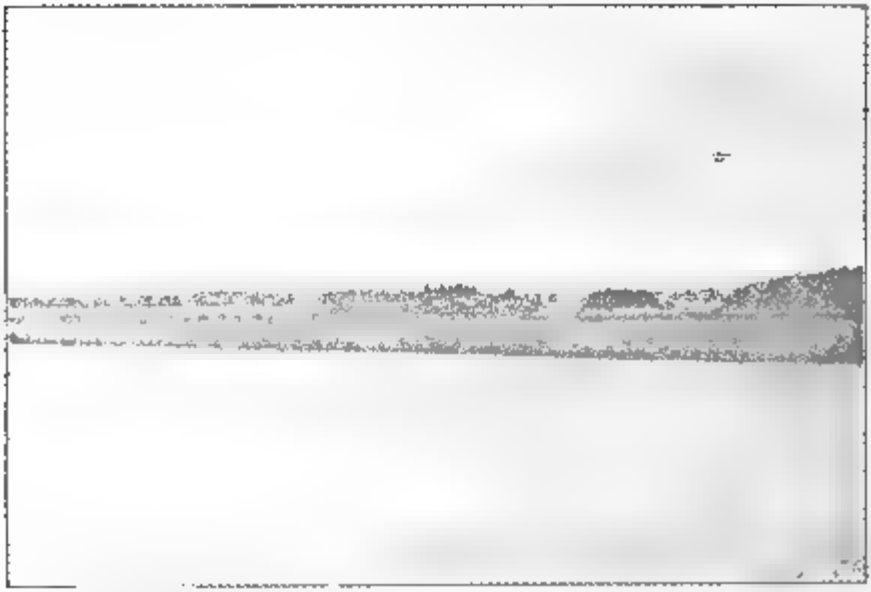
In the valleys of the main rivers are to be found the normal effects of meandering, [illegible] deposits [illegible] in the form of shore bars and islands, and the abandonment of channels. Several small streams such as Murdock creek flow through the lowlands before entering the main rivers, and have their own systems of alluvial deposits and erosion.

Although the differences in the elevation of the [illegible] above the water-table are slight, they are enough to [illegible] [illegible] and [illegible] the water-table have [illegible] [illegible] [illegible] ridges and [illegible] [illegible] [illegible] of the [illegible] ridge [illegible] [illegible] [illegible] [illegible] which [illegible] such areas. [illegible] [illegible] the [illegible] [illegible] and [illegible] the [illegible] channels [illegible] growth [illegible] again [illegible] [illegible] [illegible] Athabaska and [illegible] [illegible] poplar [illegible] [illegible] [illegible] vegetation [illegible] [illegible] the [illegible] [illegible]. This [illegible] part of the [illegible] but will now be examined in more detail.

[illegible] [illegible] Athabaska [illegible] [illegible] region [illegible] [illegible] [illegible] was separated from [illegible] [illegible] the [illegible] [illegible] [illegible] Athabaska [illegible]. The [illegible] [illegible] by these streams [illegible] increased the rate of [illegible] [illegible] of the [illegible] but [illegible] the part played by [illegible] [illegible] places for [illegible]. The basin has been filled [illegible] present condition largely by this process of deposit.

The Athabaska [illegible] had [illegible] [illegible] farther to the west [illegible] at present, probably to the west of Embarras channel. [illegible] [illegible] nearly [illegible] a graded [illegible] [illegible] [illegible] where the [illegible] [illegible] The Athabaska [illegible] [illegible] the great- [illegible] at [illegible] mouths of the Embarras, Fletcher [illegible] and Big [illegible] channels. The southeast shores of lake Claire, [illegible] and between lake Claire and Mamawi [illegible] far north as Hay [illegible] [illegible] Mamawi [illegible] been formed [illegible] [illegible] [illegible] [illegible] a large part of [illegible] [illegible] [illegible] [illegible] of lake Claire. The [illegible] of the Athabaska in Hay River area and in the delta of the Quatre Fourches. The

PLATE IX



A. Gravel beach at delta of creek near the western end of lake Athabaska.

B. Delta of Pine Marten creek near lake Manawi.
(See Figures 9 and 12, B.)

latter stream, with Revillon Coupe and Rivière des Rochers, are the only [illegible] now connected with lake Athabaska and the [illegible] Mamawi [illegible] [illegible] Peace [illegible] [illegible] where [illegible] [illegible] by the Peace [illegible] where [illegible] [illegible] of the southern part of Great Slave lake [illegible] The Quatre Fourches [illegible] lake Mamawi and [illegible] lake Athabaska [illegible] carrying the waters of Birch [illegible] [illegible] except by the channels of Hay [illegible] lake Mamawi.

The [illegible] delta plains slope a gentle rise away from the [illegible] as the [illegible] ridges that have been formed [illegible] [illegible] by the [illegible] When [illegible] [illegible] the slough and [illegible] [illegible] channels begin to [illegible] lake.

[illegible] the former lake [illegible] [illegible] [illegible] [illegible] [illegible] the [illegible] [illegible] [illegible] The [illegible] of the [illegible] lake Mamawi [illegible] be discussed later [illegible] serve to illustrate this point.

Peace [illegible] have meandered extensively through [illegible] [illegible] their [illegible] great island [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] shore [illegible] have [illegible] [illegible] away [illegible] the river. The [illegible] [illegible] of the currents that [illegible] them. If the eddy currents made by the curve of the river are [illegible] the deposits are [illegible] mainly of sand. A [illegible] [illegible] terraces [illegible] larger amount of [illegible] These differences [illegible] the plant cover develops.

The [illegible] the great [illegible] islands formed [illegible] as [illegible] described by F. M. Kindle. Rock outcrops [illegible] may serve to start the [illegible] currents [illegible] of [illegible] [illegible] further accumulation [illegible] the current of the river [illegible] a meander curve tending to [illegible] and retard the speed of the [illegible] [illegible] [illegible]

[illegible] clearly [illegible] [illegible] of the banks [illegible] [illegible]

Abandoned channels either of the main streams or their tributaries, recently separated by low levees, ridges much like those in delta plains. More detailed accounts of such phenomena in specific localities will be given in connection with the vegetation.

It is evident from this brief treatment that the lowland districts present endless variations in the form of the land surfaces, involving the deposit of alluvial materials, both in the delta, local flood-plains and on islands in the river channels. As these new lands come into being they are exposed for the invasion of a cover of vegetation which is selected from similar habitats in surrounding areas. The process has been going on since the whole area was exposed at the recession of the former lake, and by a study of the present progress of development it is possible to gain some insight into the earlier stages.

General Trend in the Development of the Vegetation

The succession of vegetation types in the lowlands is comparatively simple in outline. On new land formed in delta plains the early stages are submerged or partly floating aquatic plants rooted in shallow mud flats. These are followed immediately by a marsh vegetation dominated by sedges and coarse grasses. On mud and sand-bars in the main streams aquatic plants are soon cut off by the current, and the first land plant to appear is usually some species of horsetail *Equisetum*. The next notable change in the succession is the growth of various species of willows, closely followed by an occupation of alders *Alnus incana*. The balsam or black poplar *Populus balsamifera* is the first tree to appear and gradually gives way to spruce *Picea glauca*. The spruce forest appears, as it does on the upland, to be the most advanced stage attainable and perpetuates itself if not altered by cutting or fire. The general outline may be indicated as follows:

There are many minor stages interpolated into this outline, differing according to the mode of origin of the succession, but the general arrangement is almost universal for the area under discussion. The convergence of all successions to the spruce forest indicates that eventually this forest may cover the whole region, provided no major changes in climate or topography occur. Furthermore, most of the variations in the major trend are to be found in those stages that precede the willows. See diagram of successions, Figure 151, and are nearer to the differing physiographic origins of the series.

An outline for the more or less detailed description of the vegetation of the lowlands may be derived from the above plan of its development. The first division will have to do with the delta plains, the second with local river deposits, and the third with those phases of the first two that are concerned with sloughs and wet meadows formed in abandoned channels, and warrant more elaboration due to their diversity.

Vegetation of Delta Plains

The following account of the delta plains is based upon collections and notes made chiefly during the month of August, 1930, at three places in Lake Mamawi district: the vicinity of the Government Dog Camp about 4 miles south of the Quatre Fourches, the Cree (Mamawi) Creek district between the lake and Reed portage on the upper Embarras, and the channels of Hay (Prairie) river on the west shore of the lake. To this material are added miscellaneous notes from the writer's journeys through the Athabaska and Peace deltas in the preceding four seasons, and the correlative data furnished by the aerial photographs.

Figure 11 A is a generalized section illustrating this vegetation.

AQUATIC ASSOCIATIONS

The shallow lake contains large areas of pondweeds that are rooted in the mud bottom but whose upper stems and leaves float at the surface. The whole lake is so filled with them that it is nearly impossible to find a way across without getting into their tangled patches. The densest growth occurs near marshy shores and about the entrances to such channels as Cree creek and Hay river.

Primary spp.	*Potamogeton vaginatus* *P. Richardsonii*
Secondary sp.	*P. gramineus* var. *graminifolius*

There appears to be a succession of these species related to the depth of the water. *P. vaginatus* grows in the greatest depths, followed by *P. Richardsonii*. The secondary species is more common among the outer vegetation of the shore.

SHORE ASSOCIATIONS

On very gently sloping shores these associations merge in broad bands with those on either side of them, so that their exact margins cannot be designated. At the time of this survey it was possible to push a light canoe all the way through the shore vegetation and well into the first of the meadows, but such high water conditions were regarded as unusual by the local inhabitants.

Primary spp.	*Scirpus validus* *Potamogeton gramineus* var. *graminifolius* *Eleocharis palustris*
Secondary sp.	*Glyceria grandis*

Eleocharis is not so generally distributed as *Scirpus* and *Potamogeton*, and *Glyceria* attains great abundance in a few places. As will be brought out in further records, *Scirpus validus* and *Potamogeton gramineus* var. *graminifolius* are the chief pioneers in colonizing this type of lake shore, and are general in their situations throughout the deltas. Where the section was made this association is about 20 yards wide.

Merging with the shore type is a wet meadow of sedges and tall, coarse grass. It is between 100 and 200 yards wide at this place, and although in standing water it forms a dense growth

Primary spp.	*Carex trichocarpa* var. *aristata*
	Fluminia festucacea
Secondary spp.	*Potamogeton gramineus* var. *graminifolius*
	Brasenia sp. *Syngenchae*
	Calamagrostis canadensis
	Glyceria grandis
	Carex aquatilis
	Scirpus validus
	Eleocharis palustris
	Sium suave

Glyceria Eleocharis and *Potamogeton* are found mainly at the wetter, lake-ward margin. *Carex trichocarpa* var. *aristata* is one of the most important plants of the lowlands due to its abundance and value as forage. Most of the hay that has been cut for many years in the sloughs along upper Slave river is of this plant as will be shown later. It is also an important source of winter feed for the buffalo. The tall grass *Fluminia* is not so uniform in distribution as the sedges, becoming more common in wetter areas like those that occur on the delta plains. In drier parts of the sedge meadow, near upland plants such as *Potamogeton*, *Scirpus*, *Carex aquatilis*, *Eleocharis* and *Glyceria* disappear and the stand of the dominant *Carex* becomes nearly pure, with the grasses *Phalaris arundinacea* and *Fluminia festucacea* appearing in a few places.

Between the sedges, which appear dark green on the landscape, and the nearest willow groves, there is an extensive meadow of blue-joint grass *Calamagrostis canadensis*.

Primary sp.	*Calamagrostis canadensis*
Secondary spp.	*Polygonum coccineum* forma *Natansphila*
	Mentha canadensis var. *glabrata*
	Stachys scopulorum

The predominating species is one of the commonest in the Athabaska-Great Slave Lake region, but outside the delta plains and some of the upland semi-open prairies it is confined to the willow margins of shores and sloughs (See Figures 9, 10, 11, 12). In the Athabaska-Peace delta it covers many square miles with a close turf accompanied by very few other species, and is one of the most important sources of hay and forage the country possesses. Many buffalo feed upon it the year around, and it serves as autumn and winter feed for the herds that migrate to the low areas at those seasons of the year. Among the Quatre Fourches the inhabitants of Chipewyan Lake for many years cut every bit of hay from the meadows of this grass. Plate X A is a photograph of new stacks of hay cut during the summer of 1930. In the latter part of August the fruiting panicles were turning to a red-purple hue, resembling one of fields of ripening grain on the prairies farther south.

Variations in the associations of the shores and meadows are chiefly in the way of expansions and contractions in width and prominence. The low-lying deltas around the eastern ends of the Hay River channels show a general widening, particularly of the shore types, involving a much more abundant growth of *Scirpus* and *Glyceria* than in the section discussed

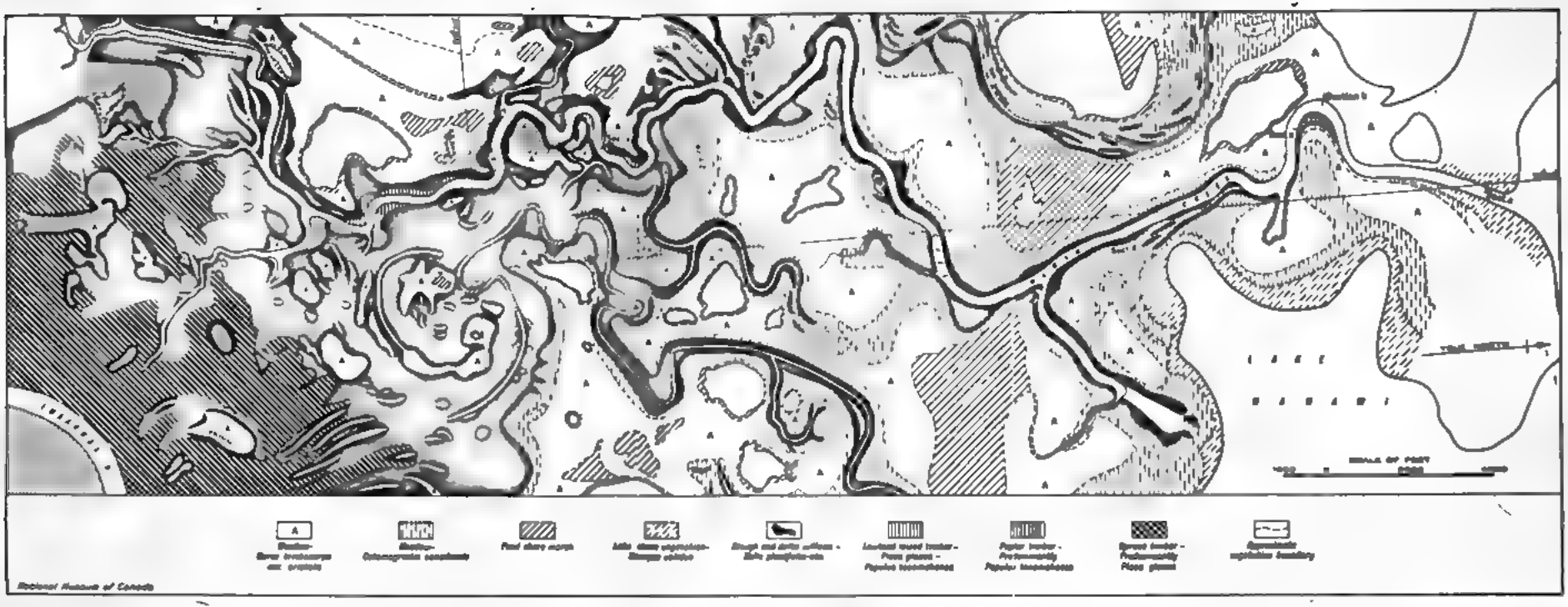
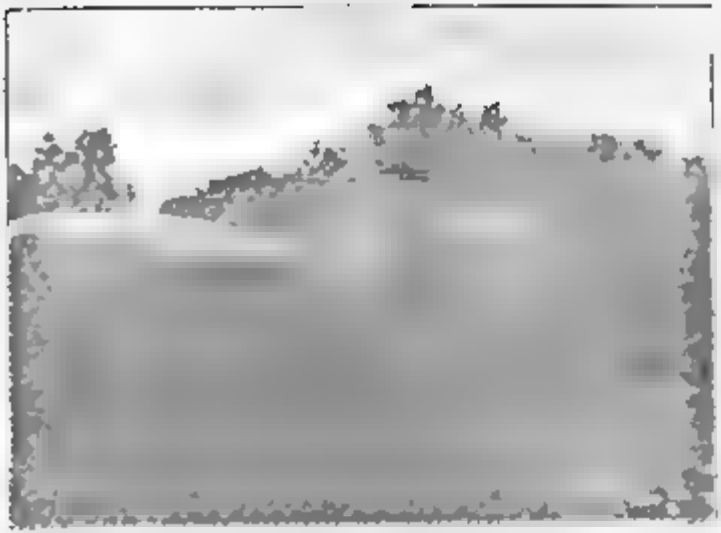
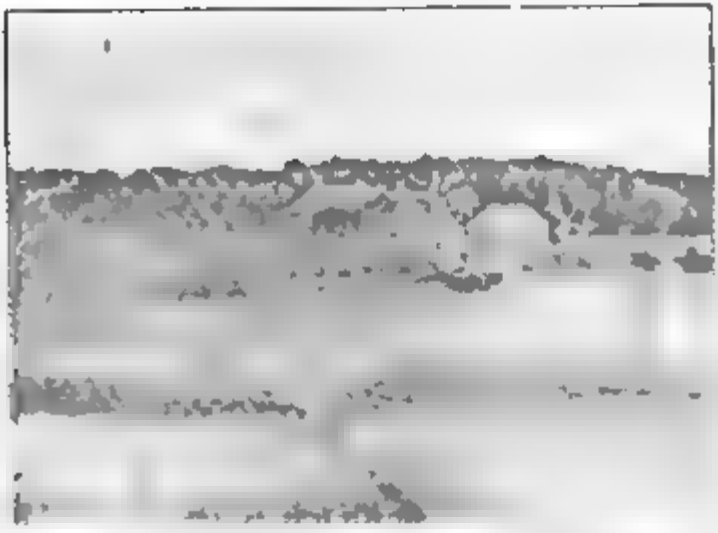


Figure 4 Map of vegetation in the Cree (Manawet) Creek district, Athabaska River delta.

Plate X



August, 1930.



above. On shores exposed to wave action, as at the Government Dog Camp, the marsh has nearly disappeared, and the alluvial soil is cut back to such an extent that the *Calamagrostis* meadow grows on a low bank at the water's edge. This was also noted on the east shore of lake Claire, at the western end of Hay river. The waves not only cut back the shores but also thrown up low ridges of debris which lead to a more mesophytic vegetation in the form of willows. A thin line of willows is clearly seen along the east shore of lake Mamawi (Figure 10). Plate X B is a photograph of storm waves actually eroding the shore at the Dog Camp.

SHRUB ASSOCIATIONS

Low ridges on the margins of stream channels, old mud bar formations around the bases of granite hills, and certain shores subject to wave erosion have willow groves covering them and pushing out into the drier parts of the *Calamagrostis* meadows. The pioneer species is usually *Salix planifolia*. A considerable number of other species occupy the loose growth of willows at the margins of the groves.

Primary spp.	*Salix planifolia*
	Calamagrostis canadensis
Secondary spp.	*Poa pratensis*
	Phalaris arundinacea
	Salix petiolaris
	S. lasiandra
	S. Bebbiana
	Urtica gracilis
	Polygonum natans forma *Hartwrightii*
	Rumex mexicanus
	Ranunculus pennsylvanicus
	Anemone canadensis
	Potentilla Anserina
	Geum strictum
	Sium suave
	Cicuta occidentalis
	Mentha canadensis var. *glabrata*
	Stachys scopulorum
	Physostegia parviflora
	Achillea sibirica
	Erigeron philadelphicus
	Solidago canadensis
	Aster junceus

Only the primary species have any importance as ground cover, since the others are much scattered in the partial shade of the willow clumps.

Following this open association comes a dense growth of willows whose slender trunks are so interlaced as to be nearly impenetrable, and which cause a deep shade. The ground vegetation under them is sparse and composed of plants that are prominent elements in the shrub and ground covers of the poplar and spruce forests.

Primary sp.	*Salix Bebbiana*
Secondary spp.	*Equisetum pratense*
	Corallorhiza trifida
	Ribes oxyacanthoides (seedling)
	Rubus idaeus var. *canadensis* (seedling)
	Vicia americana
	Cornus stolonifera
	Viburnum pauciflorum (seedling)
	Aster Lindleyanus

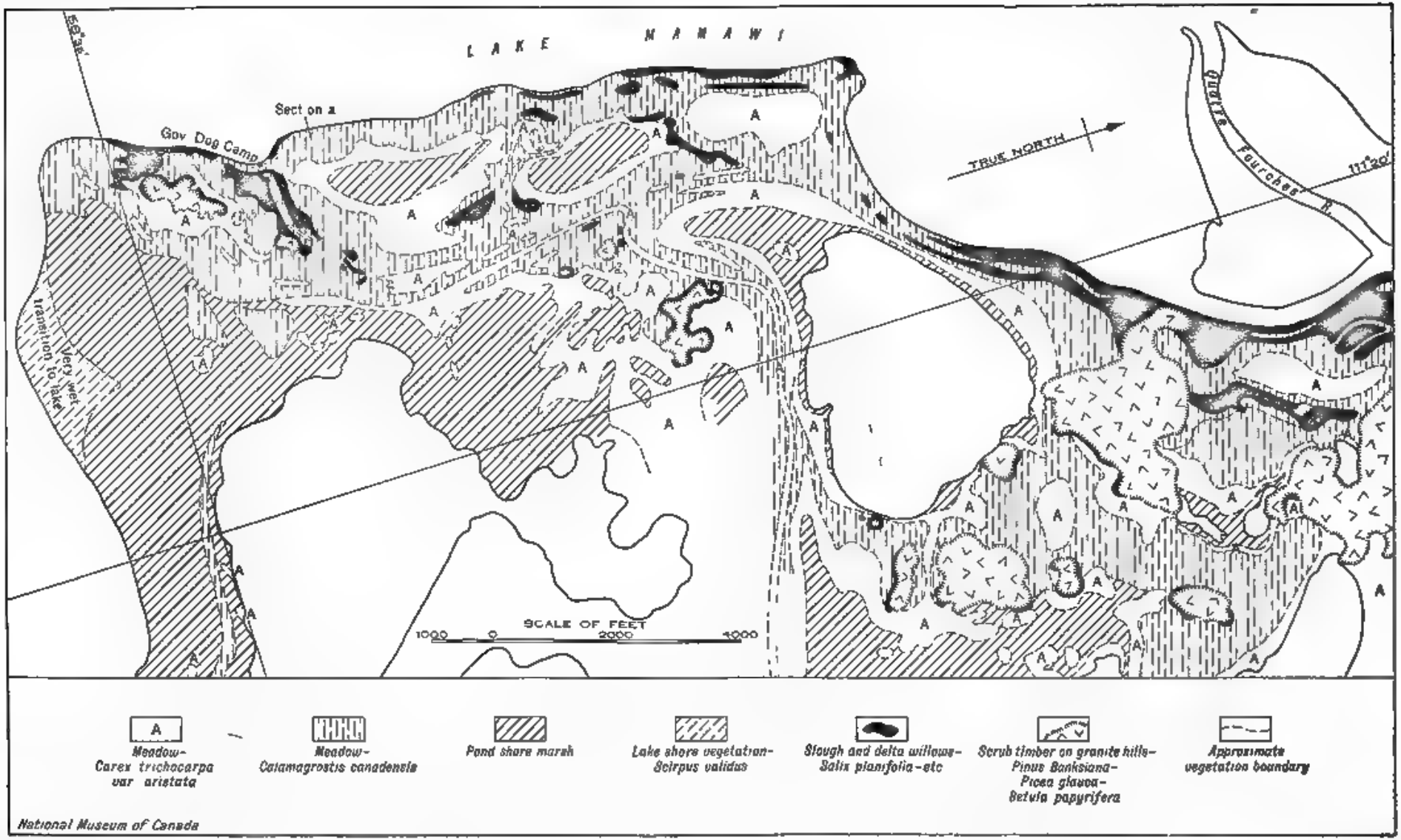


Figure 10. Map of vegetation in the delta of Quatre Fourches river, east shore of lake Mamawi.

The maps indicate the way in which the willow ridges reach out into the delta along the watercourses, appearing in large [illegible] areas only on higher ground where they gradually give way to [illegible] and spruce. On the [illegible] flats adjacent to the Dog Camp (figure 10) nearly all of the [illegible] is in meadow and slough vegetation, and the willows are restricted to the levees near the mouth of the present Quatre Fourches [illegible] strip along the lake margin in recent times, and to the slightly raised levees at the former mouths of the [illegible] creek that exists now only as a [illegible] slough. This [illegible] creek appears to have had at least three openings into the lake along the shore, each of which is indicated [illegible] by the low levees and [illegible] of the slough channels. The [illegible] of [illegible] at which willow growth [illegible] have formed [illegible] at the Dog Camp. The [illegible] in this vicinity seem to have [illegible] probably [illegible] currents [illegible] higher ridges than [illegible] in the greater [illegible] of the willows. The [illegible] of the present Quatre Fourches, along with those of the small [illegible] eastward and [illegible] another branch of the Quatre Fourches have cut off the shallow ponds from the main lake by the [illegible] lakeward deposits. Similar conditions are shown [illegible] of [illegible] development due to [illegible] the Athabaska. Branches at the mouth of this creek (figure 9) show ponds in process of being cut off and [illegible] along the shore. The second eastern branch of the creek [illegible] shows clearly the way in which willow covered [illegible] when the channel ceased to function. The willow [illegible] at the Dog Camp [illegible] had the same origin.

[illegible] the delta the [illegible] to be [illegible] by willows are the sloughs that have arisen as the ponds above mentioned. A treatment of this process will be found in the discussion of slough vegetation.

Where larger and more active streams are building levees far out into the lakes, as at the Quatre Fourches and Embarras, the pioneering willow [illegible] above, *Salix [illegible]*, is replaced wholly or in part by the sand-bar willow, *Salix interior* var. *pedicellata*. This species is the commonest throughout the more actively developing flood plains of the region.

TREE ASSOCIATIONS

As shown by the map, the first tree growth in the delta occurs as isolated patches of balsam poplar, *Populus tacamahacca*, along the banks of the streams in the [illegible] parts of the [illegible] area. [illegible] appear among the [illegible] before the poplars and form a transition species between the two types of vegetation. The poplar association is widespread throughout the flood plains and is merged with spruce forest in all sorts of combinations.

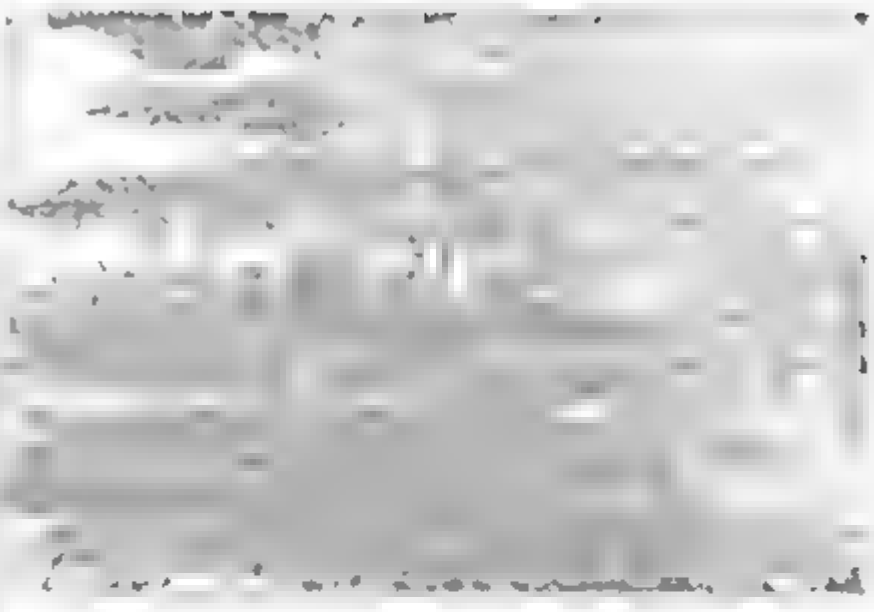
Primary spp.	*Populus tacamahacca*
	Equisetum pratense
	Salix Bebbiana
Secondary spp.	*Picea glauca* (young trees)
	Salix arbusculoides
	[illegible]
	Actaea rubra
	Rosa acicularis

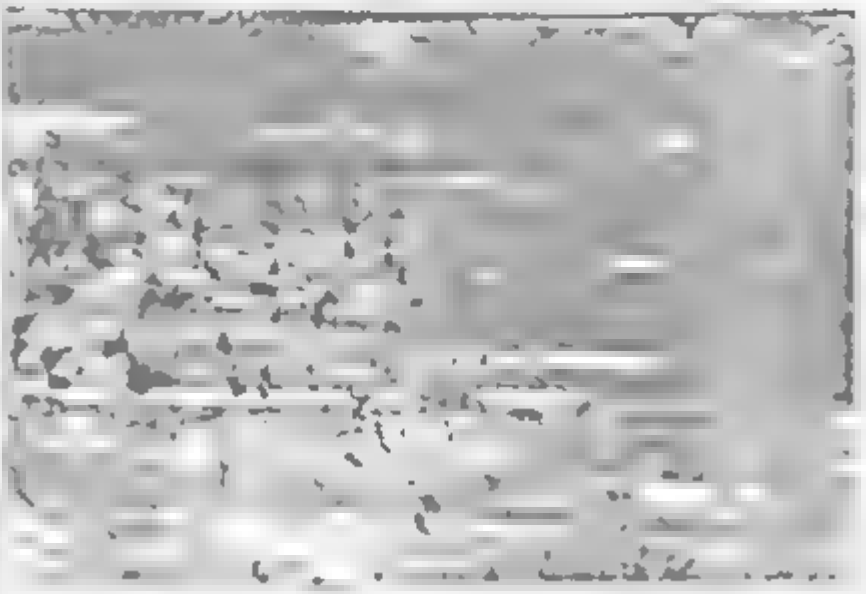
Rubus idaeus var *canadensis*
Vicia americana
Epilobium angustifolium
Aralia nudicaulis
Cornus stolonifera
Pyrola asarifolia
Viburnum pauciflorum
Aster Lindleyanus

Although this list of secondary species is not complete, it contains those that are the most characteristic and shows the trend of the forest toward mesophytism. Young Canada spruces germinate in the shade of the poplars, alders and willows, and gradually occupy larger areas. If undisturbed, the dominance of the spruce becomes complete so that pure stands of it are not uncommon along the main rivers. The ground cover in the poplar forest is very scanty containing but few mosses. With the coming of the spruce a close mat of mosses is formed over a relatively thick layer of leaf mould. The herbaceous and shrub floras in the spruce are exceedingly scant. *Viburnum pauciflorum*, *Rosa acicularis*, *Shepherdia canadensis*, *Rubus acaulis*, *R. pubescens*, *Equisetum pratense*, *Maianthemum canadense*, *Orchis rotundifolia*, *Goodyera repens* var *ophioides*, *Habenaria obtusata*, *Geocaulon lividum*, *Mitella nuda*, *Pyrola secunda*, *Moneses uniflora*, and *Linnaea borealis* var *americana* make up the most of this scattered cover.

Since the combination of spruce and balsam poplar, with the spruce often predominating, is the commonest type of timber seen in the deltas, it will be listed in more detail.

Primary spp.	*Picea glauca*
	Populus tacamahacca
	Salix Bebbiana
	Viburnum pauciflorum
	Cornus stolonifera
Secondary spp.	*Equisetum pratense*
	Maianthemum canadense
	Alnus incana
	Geocaulon lividum
	Actaea rubra
	Ribes oxyacanthoides
	R. hudsonianum
	R. triste
	Mitella nuda
	Rosa acicularis
	Rubus pubescens
	R. idaeus var *canadensis*
	Fragaria glauca
	F. ovesca var *americana*
	Vicia americana
	Lathyrus ochroleucus
	Astragalus frigidus var *americanus*
	Shepherdia canadensis
	Cornus canadensis
	Pyrola asarifolia
	P. asarifolia var *incarnata*
	P. secunda
	P. chlorantha
	Moneses uniflora
	Mertensia paniculata
	Galium boreale
	Linnaea borealis var *americana*
	Aster Lindleyanus





It has been stated elsewhere that the balsam fir *Abies balsamea* finds a northern limit in the lower Athabaska valley. It was found in the [illegible] (summer 1930) near the head of Cree [illegible] Mamawi [illegible] has not been seen by the writer elsewhere in the district under discussion. In more southern regions it accompanies Canada spruce in the mature forests.

Vegetation of Local River Deposits

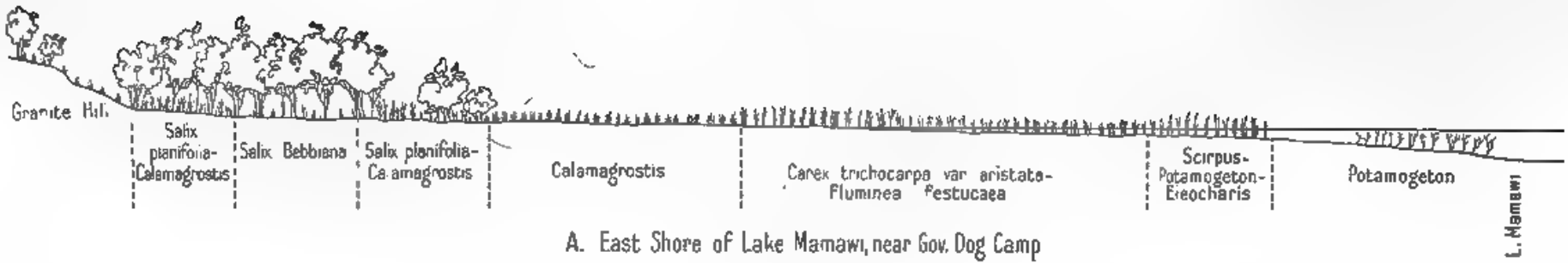
[illegible] on the local river flood plains and islands [illegible] of [illegible] vegetation that grows on them. It is accentuated [illegible] by the wide range of different shades of green which appear between the water's edge and the [illegible] of poplar [illegible] background. Although many [illegible] have been [illegible] detailed studies have been made at a few representative places, namely, along Peace river just below [illegible] near the Government Hay Camp on Slave river and on the [illegible] Peace river at the 30th base line. The general [illegible] of such areas has already been described.

HERBACEOUS ASSOCIATIONS

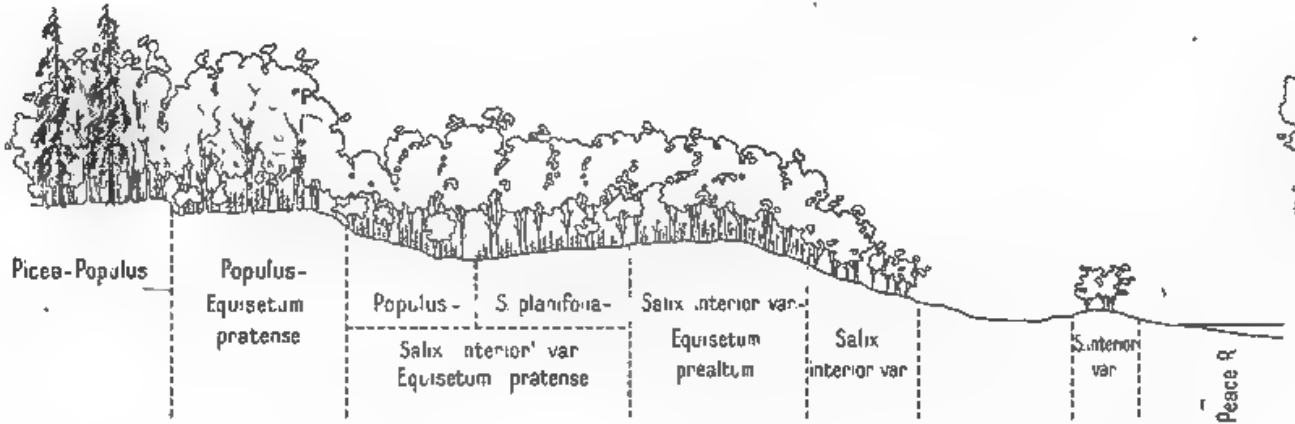
The early stages of the river shore flood plain vegetation seem to be [illegible] by the [illegible] configuration which are in turn determined [illegible] the [illegible] and [illegible] the current in the stream. Peace point is at a [illegible] bend of Peace river in the lower part of the district where the [illegible] on both sides. The "point" [illegible] a few feet above the spring [illegible] of the point eddy currents [illegible] of a series of long narrow flood plains. These have [illegible] less parallel to the shore which have been abandoned as the general level of the stream has been lowered in recent geologic time. New bars are at present forming on the existing shore (Figure 31 [illegible]). Flood waters of the present river cut back the [illegible] bars causing a sharply terraced appearance with the top [illegible] terraces sloping backward away from the river. The fact [illegible] process has been going on at this place for a very long time [illegible] shown by the extension of similar topographic forms far above the [illegible] water and at considerable distance inland. Figure 5 is a map of Peace Point area showing the arrangement of these deposits.

The shore is predominantly sandy with prominent well-drained bars. [illegible] supports practically no herbaceous vegetation on the lower levels [illegible] vegetation is of mud flat or marsh type. Its first plants are sand bar willow [illegible] pedicellata and the lowest bars have no plants whatever. The island bars at the 30th base line (Figure 11 D) illustrate the same condition.

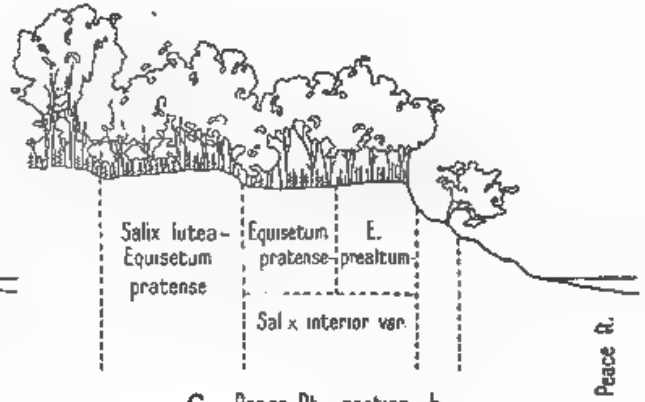
The [illegible] where the streams have less fall show the same general types of deposits except that the currents are much slower, causing bars and terraces that are very low and composed of finer more muddy soils. These are well illustrated at the Government Hay Camp and at many places in the lower deltas (See Figure 11). Their initial vegeta-



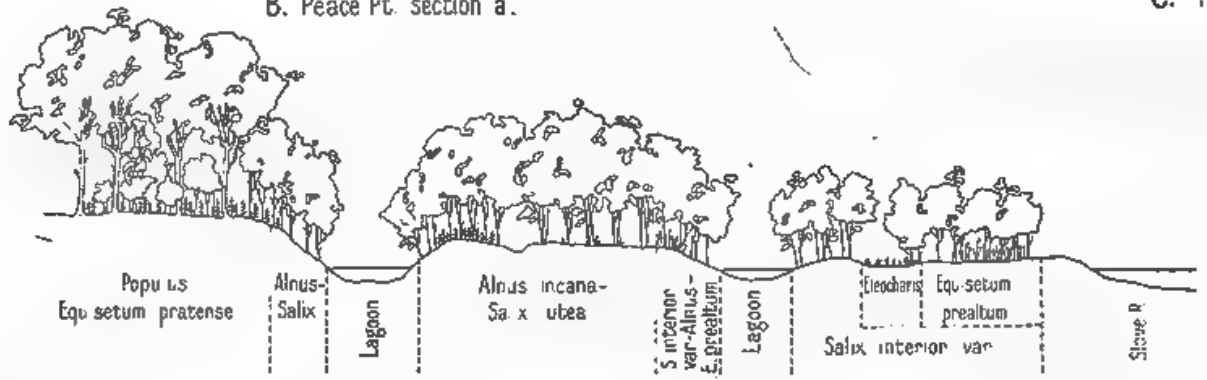
A. East Shore of Lake Mamawi, near Gov. Dog Camp



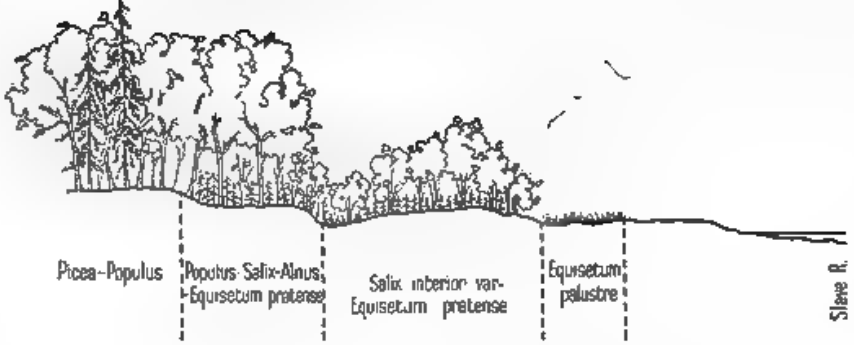
B. Peace Pt. section a.



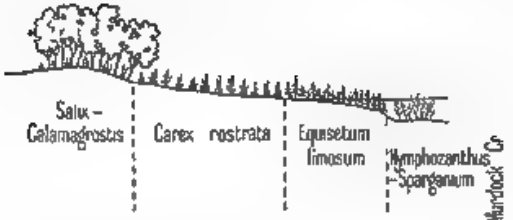
C. Peace Pt. section b.



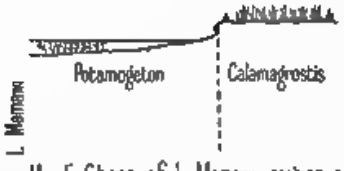
D. Island flood plain, 30th Base Line, section b.



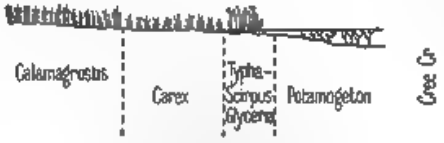
A. Shore of Slave R., Gov. Hay Camp, section a



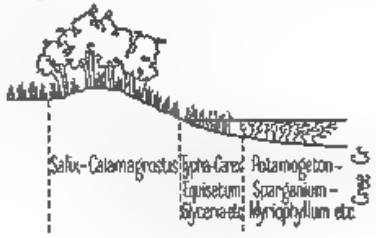
G. Shore of Murdock Cr.



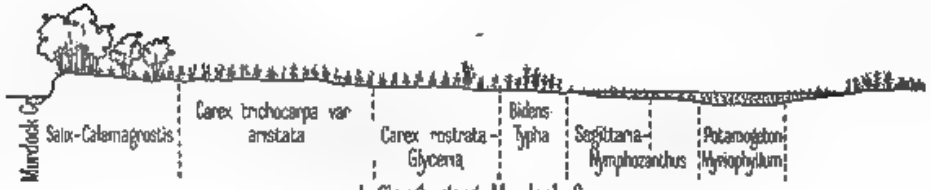
H. E. Shore of L. Mamawi, section a.



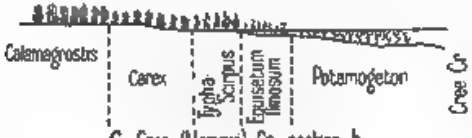
B. Cree (Mamawi) Cr., section a



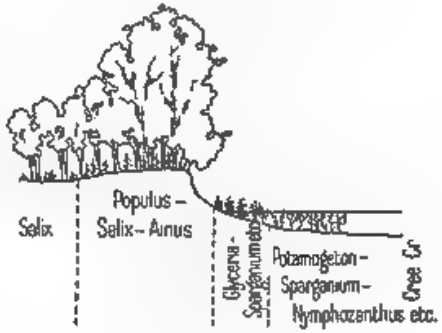
E. Cree (Mamawi) Cr., section d.



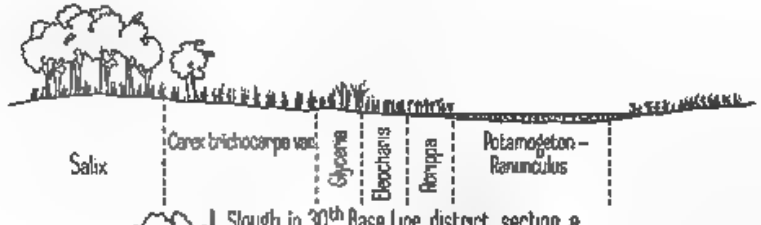
I. Slough along Murdock Cr.



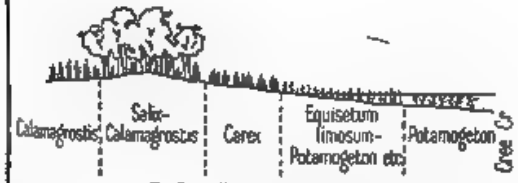
C. Cree (Mamawi) Cr., section b.



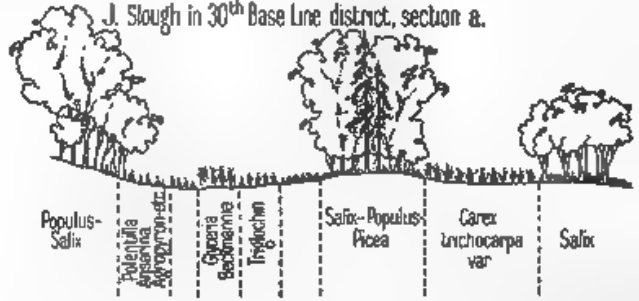
F. Cree (Mamawi) Cr., section e



J. Slough in 30th Base Line district, section a.



D. Cree (Mamawi) Cr., section c.



K. Saline Slough, Gov. Hay Camp, section b.

tion consists mainly of species of horsetail *Equisetum*. Where the current is sufficiently gentle to permit it, *E. limosum* forms dense, near-pure growths in the quiet water along shore and in the mud of the lower banks. The *Equisetum* association attains its greatest purity in the upper parts of the deltas and when seen near the actual mouths of the rivers is associated with a number of slough margin species drawn from surrounding habitats. The secondary species listed below were collected at the place where Embarras channel makes its last branching before entering lake Athabaska. All stages in the sorting out of this complex appear between this point and the upper parts of the Embarras. The same stages may be seen along the Quatre Fourches and along Cree creek, although the latter no longer has a current.

Primary sp.	*Equisetum limosum*
Secondary spp.	*Typha latifolia*
	Scirpus cuneata
	Alopecurus aequalis
	Glyceria borealis
	G. grandis
	Phalaris arundinacea
	Beckmannia Syzigachne
	Poa palustris
	Puragmites communis var. *Berlandieri*
	Puccinellia Nuttalliana
	Carex trichocarpa var. *aristata*
	Hleocharis acicularis
	E. palustris
	Scirpus validus
	Juncus nodosus
	Rumex maritimus var. *fueginus*
	R. mexicanus
	Ranunculus pennsylvanicus
	R. sceleratus
	Potentilla norvegica var. *hirsuta*
	Epilobium glandulosum var. *adenocaulon*
	Hippuris vulgaris
	Sium suave
	Mentha canadensis var. *glabrata*
	Stachys scopularum
	Senecio palustris

The shore section at the Government Hay Camp (Figure 12, A) was made at a low-water stage when a wide, barren mud flat was exposed between the river and the first vegetation. The characteristic terrace formation is evident though low in relief, and in this case is caused by a minor slackening of currents below the rocky point shown on the map (Figure 13). Further notes on the development of the Hay Camp area will be found in another part of the paper. The lower ground has an open association of *Equisetum palustre*, which trails over the mud on a terrace about 30 feet wide, reaching its greatest abundance at the landward margin.

Primary sp.	*Equisetum palustre*
Secondary spp.	*Equisetum arvense*
	Hleocharis calva
	Juncus nodosus
	Salix interior var. *pedicellata* (seedlings)
	Rumex palustris (seedlings)

The secondary species are of small importance and are commonest at the landward side, where the willow from the following association is actively colonizing the mud. There is much driftwood on the shore, mostly of large dimensions.

To summarize the herbaceous associations on these shores—they range from complete absence on sandy well-drained bars, to the abundance and complete dominance of species of *Equisetum* on low mud shores. The *Equisetum* associations vary from pure stands on the higher mud deposits of streams in which the currents are active, to associations with a large number of secondary marsh species on bars in the lower deltas where more nearly ponded conditions prevail.

SHRUB AND TREE ASSOCIATIONS

The sand-bar willow *Salix interior* var. *pedicellata* is of nearly universal occurrence as a pioneer on the local river flood-plains. It is either the first vegetation to follow the horsetail directly in the developmental succession, and is admirably adapted to the rôle by its prolific vegetative means of reproduction. Its secondary associates appear to be determined largely by the major soil differences described above, the sandy soils growing the more xeric or mesic types of plants. The latter condition is best shown at Peace point and on the island at the 301 base line. The initial vegetation is a pure stand of *Salix*, but it is followed immediately on slightly higher ground by a more complex association.

Primary spp.	*Salix interior* var. *pedicellata*
	Equisetum prealtum
Secondary spp.	*Picea glauca* (seedling)
	Agropyron tachycaulum var. *typicum*
	Agrostis scabra
	Calamagrostis canadensis var. *robusta*
	Salix lutea
	S. planifolia
	Alnus incana (young plants)
	Potentilla Anserina
	Fragaria glauca
	Epilobium angustifolium
	Cornus stolonifera (seedling)
	Castilleja Raupi
	Achillea Millefolium
	Solidago canadensis
	Erigeron philadelphicus
	E. acris var. *asteroides*

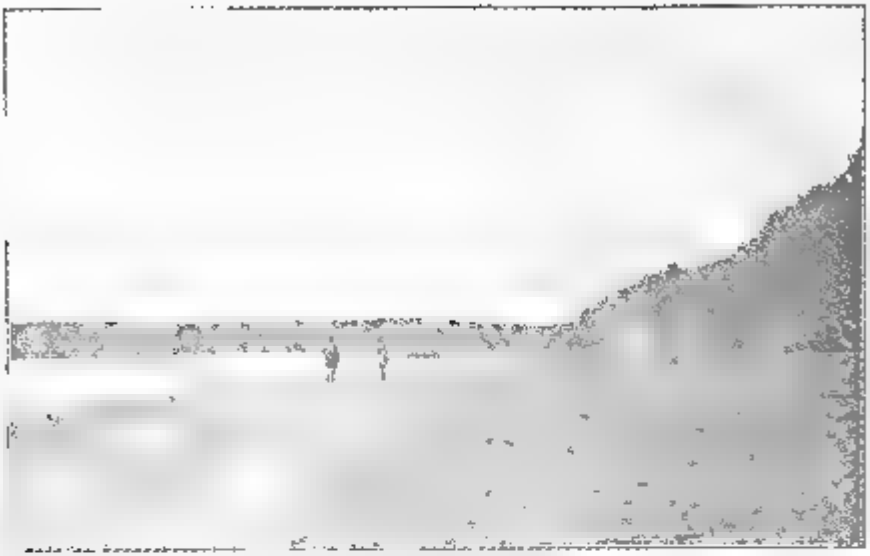
The primary species are abundant, but the secondary ones are much scattered, and for many a careful search must be made. Many of them appear elsewhere in more mesophytic associations, and here indicate the trend of the succession. On the driest spots, particularly at the outer edge of the association, the primary species are almost alone. As indicated on the diagram (Figure 11, B), however, the lower landward slope of the terrace shows a notable change in conditions. *Salix planifolia* is advanced to a primary position, whereas *Equisetum pratense* shares prominence with *E. prealtum*. In wetter places *Juncus balticus* is abundant, but most of the secondary species remain the same. *S. planifolia* is characteristically a

plants of slough margins and probably finds its way into this situation on account of the same [illegible] conditions where the lower slope of one terrace meets the more or less steep front of the next highest one above it. The landward side of this association contains a fringe of *Populus tacamahacca*, forerunners of the timber.

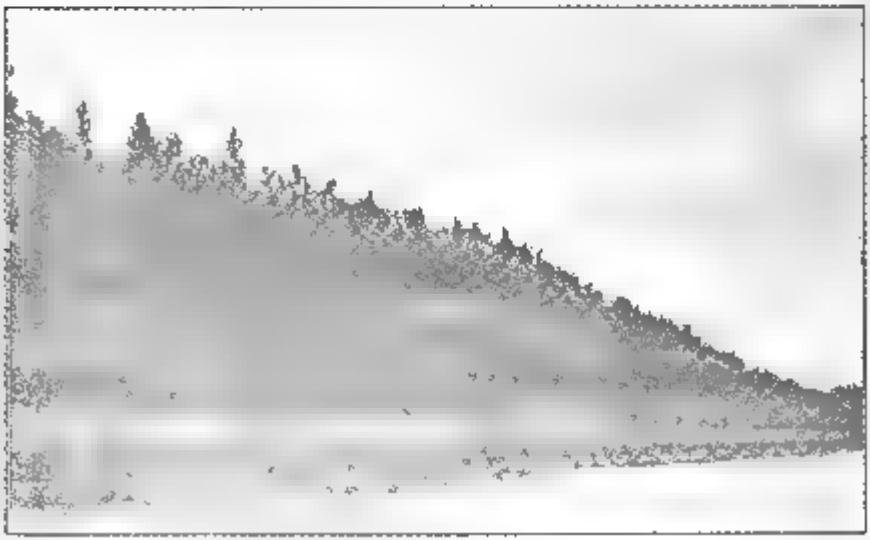
[illegible] separated from this association by the front of the next landward terrace [illegible] that may be another willow association or [illegible] of trees. If the former exists it [illegible] by a [illegible] of wide distribution in these flood [illegible] with a ground cover of the [illegible] grass *Equisetum pratense*. The ground vegetation is scanty except for the close stands of *Equisetum* but [illegible] as in the poplar association or [illegible] *Cornus stolonifera*, *Rosa acicularis*, [illegible]. The sand bar willow is still present in small numbers along with sapling balsam poplars.

[illegible] to timber in the same flood [illegible] from those already described [illegible] and [illegible] the same. [illegible] and the ground [illegible] of *Equisetum* [illegible] and [illegible]. [illegible] grass [illegible] *Equisetum* [illegible] to [illegible] stages [illegible] growth [illegible] varying ages [illegible] colour [illegible] the bluish green of the balsam poplars mixed with the nearly black spires of the spruces.

Essentially the same succession is to be found on the island at the [illegible] (see Figure 13 D and Figure 14). The different associations are there made even more prominent by being separated by long, narrow sloughs or lagoons. The low flood terraces at the Government Hay Camp do not have a willow association and the sand bar willow with a ground cover composed mainly of *Equisetum pratense* immediately follows the *Equisetum* association and adjoins the timber. It stands on a [illegible] having a wet depression at its landward side in which are a number of marsh or wet meadow plants such as *Typha latifolia*, *Beckmannia syzigachne*, *Poa palustris*, *Glyceria grandis*, *Carex rostrata* var. [illegible], [illegible] *Eleocharis calva*, *Juncus balticus*, *Ranunculus Cymbalaria*, [illegible] *Plantago major* [illegible] and *Aster* [illegible] from the margin of the timber. The lack of transition stages to the timber appears to be due to some [illegible] recent shift in the channels of the river along this shore [illegible] erosion period [illegible] the river has cut an earlier [illegible] back to the terrace that now bears the timber; a new deposit [illegible] begun which now bears the earlier stages of the vegetation. This change may be a seasonal one but this is not likely on account of the [illegible] permanence of the vegetation on the highest of the new bars. It



A. Loess river flood-plain deposit at Peace point. *See Figures 5 and 6.* B. C



B. Local flood-plain deposit in the channel of Embarras river, showing *Equisetum*, willow and poplar associations.

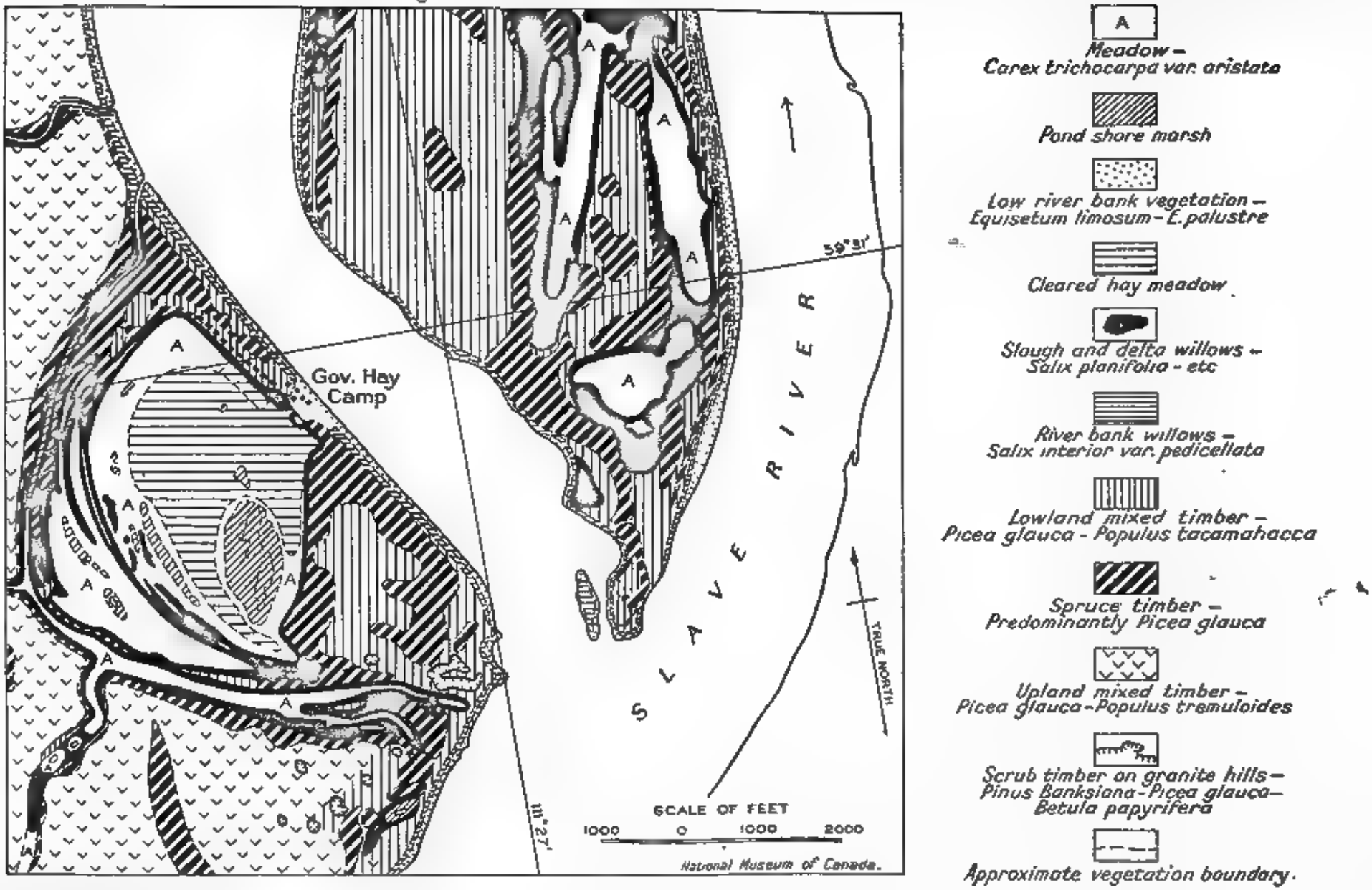


Figure 13. Map of vegetation in the Government Hay Camp district, Slave river.

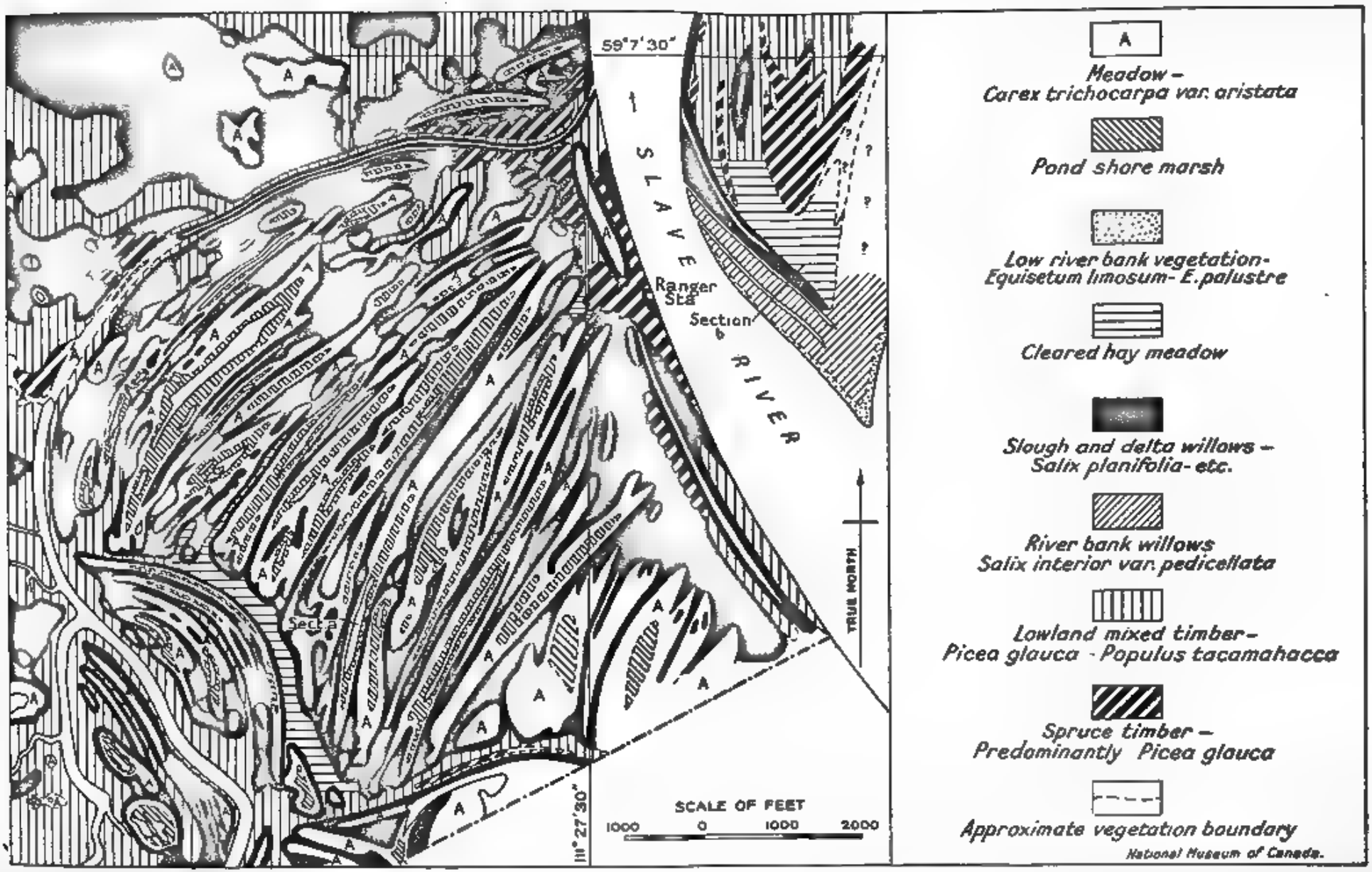


Figure 14. Map of vegetation in the 30th baseline district, Slave river.

appears, rather, to be a change involving a period of at least several years, and is possibly recurrent according to some cyclic differences in the water levels of the river in this district.

Slough and Wet Meadow Vegetation

Elements of slough and wet meadow vegetation have already been [illegible] as occurring in the shallow [illegible] undrained depressions on [illegible] flood plains and [illegible] situations on delta plains. They are [illegible] stages of development in the [illegible] vegetation [illegible] because they are situated on [illegible] water [illegible] They occur [illegible] in and [illegible] ponds [illegible] from the larger lakes in the deltas and in [illegible] of meandering streams. Both types of terrain [illegible] states of [illegible] and as a result [illegible] vegetation [illegible] ranging from [illegible] forests. The [illegible] and [illegible] differ little from those [illegible] a [illegible] stage of development.

The [illegible] has been made at the Government Hay [illegible] latitude 58° 14' in the [illegible] 30th base line and in Cree [illegible] The [illegible] of the following discussion is the order of their increasing mesophytism.

[illegible] 30th base line and Hay Camp areas [illegible] some knowledge of the topographic history involved [illegible] creek that flows [illegible] of [illegible] of the meadow [illegible] had a series of earlier [illegible] channels [illegible] now represented by the sloughs. Although its [illegible] has not been [illegible] examined the topographic features of the country indicate that the creek was once a channel of Peace river, either by itself or as a branch of the present main channel. The general lowering of the [illegible] and the opening of new drainage lines has caused it to be abandoned and to form a series of sloughs [illegible] meanders. [illegible] gives the impression of having been once a former channel [illegible] a stronger flow of water in comparison [illegible] crooked [illegible] between long straight [illegible] parts of a large river.

The [illegible] Camp [illegible] channel [illegible] The [illegible] were separated from the [illegible] which may be [illegible] the west side of the small drainage stream and then through a [illegible] The bluff [illegible] the [illegible] the entire Hay Camp [illegible] now seen [illegible] that [illegible]

[illegible] The [illegible] district that lies between the [illegible] granite hills is

composed of low ridges that decrease in elevation toward the north and have the form of bars. Those nearest the hills are most prominent and are largely made of sand. The [illegible] nucleus formed an embayment later to become the present meadow, which was finally cut off completely by the long low bars on which the present camp buildings stand. A section of the vegetation on these long levees has already been discussed (Figure 12 [illegible]). There are streams that empty into the old embayment maintained their connection with the river for a long time after the former was made into a [illegible] south along the [illegible] and the other northward along the [illegible] of the end bluff. Both of these occupied what was probably a last [illegible] channel of the river to be cut off as the deposits [illegible] eastward. The remnants of this ancient channel are to be seen in the comparatively broad sloughs that lie to the southwest of the [illegible]. The northernmost of the small creeks probably still has a slight current [illegible] of [illegible] water, but the other is reduced to a slough with [illegible] cut off from the main river by low banks upon which is a heavy growth of timber.

The [illegible] vegetation now found in the Hay Camp lowland is the spruce forest on the old bars about the granite hills. It has a rather thick mat of mosses and leaf mold and has the scant herbaceous ground flora of [illegible] woods. This association grades off on younger areas to [illegible] greater proportion of aspens and willows in which spruce [illegible] the higher [illegible] the lower ridges. The meadows themselves are [illegible] in the process of drying up and there is practically no standing water in them by the latter part of the summer.

AQUATIC ASSOCIATIONS

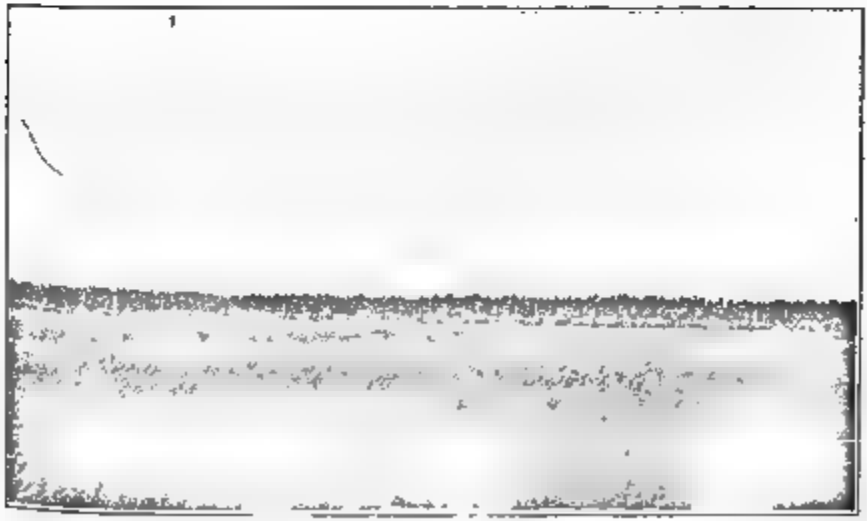
[illegible] creek flows in an exceedingly crooked channel through a low [illegible] upper Slave river. It has so little current that vegetation [illegible] habitat [illegible] quiet ponds has begun to grow in it, particularly [illegible] the margins at the curves where the current is slow [illegible]. Deeper water has open associations of the [illegible] *[illegible] aquatica* and the bur reed *Sparganium angustifolium*. [illegible] are *Potamogeton gramineus* var. *graminifolius*, *Sagittaria [illegible]*, *Polygonum natans*, and *Hippuris vulgaris*. *Sagittaria* is [illegible] these species and in many places is rooted in deep water, [illegible] leaves to the surface.

[illegible] creek has the form of a flowing stream it has no perceptible current. Consequently it has begun to develop a much more [illegible] aquatic vegetation which increases toward the upper end of the channel. The [illegible] water contains pond weeds [illegible] *Potamogeton Richardsonii*, *P. [illegible]*, and *P. vaginatus*. Close to the shore are *Myriophyllum exalbescens*, *Sagittaria cuneata*, *Nymphozanthus variegatus*, *Ranunculus aquatilis* var. *capillaceus*, *Polygonum natans*, *Sparganium [illegible]*, and *Chara* [illegible]. None of these attain any great abundance but occur in patches of individual species or of two or three together. There is an abundant plankton flora that has not yet been examined. Near the lake the patches of *Potamogeton* are similar to those in the open water off the delta.

The next stage is to be found in ponds that have no connexion with larger bodies of water, and is well illustrated in the abandoned channel

PLATE XIII

A. Slough vegetation along Murdock creek (See Figure 12, I)



B. Hay meadow slough at the Government Ha. Camp, Slave river

sloughs along Murdock creek and at the 30th base line. Cow-lily *Nymphozanthus variegatus* is the commonest species, but there is a dense tangle of other aquatics.

Primary sp.	*Nymphozanthus variegatus*
Secondary spp.	*Potamogeton Friesii*
	P. praelongus
	P. natans
	P. [illegible]ermanni
	P. zosteriformis
	Sag[illegible]ria cuneata
	Lemna trisulca
	L. minor
	Ceratophyllum demersum
	Ranunculus aquatilis var. *capillaceus*
	R. Purshii
	Myriophyllum exalbescens

The water is only 1 or 2 feet deep over a thick accumulation of vegetable remains in the form of black muck. The level is subject to considerable fluctuation during the summer season so that in July and August such aquatic plants as the cow-lily and the arrow-leaf *Sagittaria cuneata* grow as emergent vegetation on the semi-dried substratum.

SHORE ASSOCIATIONS

As already stated slough margins have much in common with the marshy shores of low river flood-plains and deltas. Their main divisions consist of a zone of emergent aquatic plants which have well-developed rootstocks colonizing submerged peaty materials and a zone of sedges and grasses which forms a transition to the surrounding meadows. These have their simplest organization in partly ponded places like Murdock and Cree creeks where the first zone is nearly all *Equisetum limosum* and the second is a close growth of *Carex rostrata* with *Scirpus validus* occasional. Near the mouth of Cree creek the inter-relationship between this type of shore and that of the delta margin is clearly seen (Figure 12 C). *Scirpus validus*, a lake shore plant, is in an association with *Typha latifolia* a pond margin species and enclosed between zones of *Equisetum limosum* and *Carex rostrata*.

In slough ponds the emergent aquatic association is quite variable in its floristic content not only in different ponds but also around a single pond. At the 30th base line a dense growth of the cress *Rorippa palustris* surrounds the water advancing into it with an abundance of floating seedlings. Following this is a zone of *Eleocharis palustris*, and then one in which *Glyceria grandis* is the primary species. In similar sloughs at the Hay Camp and along Murdock creek *Bidens cernua* takes the place of *Rorippa*.

Primary sp.	*Bidens cernua*
Secondary spp.	*Sparganium eurycarpum*
	Sagittaria cuneata
	Glyceria grandis
	Beckmannia Syzigachne
	Eleocharis palustris
	Rumex maritimus var. *fueginus*
	Ranunculus sceleratus
	Epilobium palustre
	Hippuris vulgaris

Where the water is nearly or quite evaporated off during the summer, leaving a semi-dry condition for a short period, *Bidens* ceases to make a consistent zone, and is broken up by alternating *Typha latifolia*, *Carex rostrata*, and *Glyceria grandis*. The cat-tail *Typha* is variable in its selection of a habitat, sometimes appearing at the edge of standing water where it alternates with *Bidens*, and in others showing its ability to withstand desiccation better than the latter species by growing in semi-dry muck. Sloughs in a nearly dry state, like those at the Hay Camp, have an open association, on exposed damp ground, of *Beckmannia Syzigachne*, *Alopecurus aequalis*, *Eleocharis acicularis*, and *Rumex maritimus* var *fueginus*. Several random observations here and in the Murdock Creek meadows indicate that *Beckmannia* finally dominates this group and is possibly the last stage prior to the complete dominance of the meadow vegetation by *Carex trichocarpa* var *aristata*. There are small patches of *Beckmannia* in nearly pure stand surrounded completely by the sedge.

The second zone of shore plants is made up almost exclusively of *Carex rostrata*, which usually follows the emergent aquatics already described. It has only a few associates, mainly the more water-loving plants of the meadow flora, and merges imperceptibly into the *Carex trichocarpa* association.

MEADOW ASSOCIATIONS

In general aspect the wet meadow association of the tall sedge *Carex trichocarpa* var *aristata* closely resembles that of the delta plains. It is drier here, however, and contains a number of secondary species not observed in the lower areas.

Primary sp.	*Carex trichocarpa* var *aristata*
Secondary spp.	*Fluminia festucacea*
	Calamagrostis inexpansa var *brevior*
	Agrostis scabra
	Polygonum natans forma *Hartwrightii*
	Rumex occidentalis
	Stellaria longifolia
	S. borealis
	Rorippa palustris
	Geum macrophyllum var *perincisum*
	Potentilla norvegica var *hirsuta*
	Epilobium palustre
	Sium suave
	Mentha canadensis var. *glabrata*
	Stachys scopulorum
	Scutellaria epilobufolia
	Galium trifidum
	Aster punicens
	A. junceus
	Cirsium Drummondii

The dominant *Carex* is rarely found in fruit in these meadows. The writer has collected the species in deep water on the shore of Moose lake where it was fruiting heavily in August, 1929. It was also fruiting in the wet meadows about lake Manawa and in the semi-open prairies at the base of the Carmon mountains in 1930. During its fruiting season in 1928 it was necessary to make a long search in the meadows at the Hay Camp and at Murdock creek to find enough fruit for specimens. In these meadows

the plants have interwoven, more or less decumbent stolons or off-sets which produce the current year's growth at their tips. A green bud persists through the winter among the dead leaf-bases at the tip of the stolon, and appears to be an important item in the winter feed of herds of buffalo which have for a long time frequented the sloughs at that season. It is possible that continued yearly "pruning" of these plants has induced a certain vegetative reliance upon vegetative means of propagation. The sedge makes up the bulk of the hay cut at the Government Hay Camp and at Ryan's Hay Camp on the east side of Slave river just above Demicharge rapids.

The *Calamagrostis* associat on so prominent on the delta plains is here confined to the willow margins of the sloughs where it is associated with other herbaceous species similar to those listed for such places in the deltas.

SHRUB AND TREE ASSOCIATIONS

The configuration of the willow thickets around the sloughs is shown on Figures 13, 14. The transit on through these to timber need not be discussed further since it differs very little from that in the deltas. *Populus tremuloides* and *Betula papyrifera* are rather common on the higher ridges separating the sloughs indicating a somewhat more mesophytic trend in the successions than appears in the newer flood-plains.

The contrast between the shrub successions on sandy river flood-plains and on slough margins is clearly indicated by the willows in the 30th base line district. The following is a table of the species in the order of succession:

SLOUGH MARGINS	ISLAND FLOOD-PLAIN
Salix planifolia	*Salix interior* var *pedicellata*
S. petiolaris	*S. lasiandra*
S. Bebbiana	*S. lutea*
	S. Bebbiana

It will be noted that the two situations have no species in common except in the later stages.

At the western margin of the Hay Camp lowland, small streams flow from the Salt Plain to the westward and contribute a little water to the narrow sloughs. A section of one of these sloughs (Figure 12, K) shows the effect of the slightly saline condition. The centre is nearly dry and has a close growth of *Beckmannia Syzigachne* and *Glyceria grandis* but instead of being followed by a zone of *Carex rostrata* as would be expected, there is one of *Triglochin maritimum*, a characteristic plant of saline slough margins in the upland.

Primary sp.	*Triglochin maritimum*
Secondary spp.	*Hordeum jubatum*
	Beckmannia Syzigachne
	Atriplex patula
	Ranunculus Cymbalaria
	R. Macounii
	Potentilla Anserina
	Hippuris vulgaris
	Sium suave
	Mentha canadensis var *glabrata*
	Plantago major var *asiatica*

In some places certain of the secondary species, *Mentha* and *Ranunculus Cymbalaria*, attain primary rank.

Between the *Triglochin* association and the willow margin is a narrow meadow-like area dominated by *Potentilla Anserina*, *Poa pratensis*, and *Agropyron trachycaulum* var *typicum*. A mixture of secondary species from the willow margin and from the preceding association occurs with them.

Flora of the Granite Hills

The granite hills, which rise out of the lowlands, have a distinctive flora which is unrelated to that of most of Wood Buffalo park, and which is made up of extensions of the scrub vegetation east of Slave river just as the hills themselves are outliers of the Precambrian rocks. No extensive studies of the history of the hill vegetation have been made, and the following lists are from general collections and notes made along the Quatre Fourches in 1927, at the Government Hay Camp in 1928, and on the east side of lake Mamawi in 1930. More or less extensive investigations of this flora were carried on by the writer and his wife in 1926, in the vicinity of Shelter point, on the north shore of lake Athabaska (51, 57, 58).

Primary spp.	*Pinus Banksiana*
	Betula papyrifera var *neoalaskana*
	Picea glauca
	Amelanchier florida
	Arctostaphylos Uva-ursi
	Saxifraga tricuspidata
Secondary spp.	*Cryptogramma crispa* var *acrostichoides*
	Polypodium virginianum
	Juniperus communis var *montana*
	Agrostis scabra
	Festuca saximontana
	Elymus innovatus
	Poa paludigena
	P. glauca
	Calamagrostis canadensis
	Carex siccata
	Maianthemum canadense
	Salix Bebbiana
	Populus tremuloides
	Alnus crispa
	Geocaulon lividum
	Anemone multifida var *hudsoniana*
	Corydalis sempervirens
	Heuchera Richardsonii
	Ribes oxyacanthoides
	Fragaria glauca
	Potentilla tridentata
	P. pennsylvanica
	Geum triflorum
	Prunus pennsylvanica
	Rubus idaeus var *canadensis*
	Rosa acicularis
	Lathyrus ochroleucus
	Shepherdia canadensis
	Epilobium angustifolium
	Vaccinium canadense
	Galium boreale

Symphoricarpos albus var *pauciflorus*
S. vaccinoides?)
Campanula rotundifolia
Solidago oreophila
Achillea Millefolium
Arnica chionopappa
Antennaria nitida
Hieracium canadense

The climax variations in the jackpine-birch scrub timber occur where crevasses or depressions are left undisturbed for sufficient time to develop a spruce forest or where clearing and burning have been the rule for a long time. The first of these conditions is found in a few places among the larger islands along the Quatre Fourches. A moss and humus carpet develops, with rather open stand of spruce and scanty herbaceous flora. On the other hand the low "islands" in the Lake Mamawi district have been campsites for generations of hunters and travellers, and have been burned off repeatedly. The result is a scrubby aspen timber bringing most of its characteristic species or possibly the complete absence of timber with the introduction of a prairie flora closely suited to that of the river bank at Peace point. The small patches of prairie however may be a perfectly normal growth in this area. There are several hills with small patches of clayey soils which have long been used as garden spots, and the prairies are found on such of these spots as are undisturbed.

Changes Caused by Burning and Clearing

The writer has studied no newly burned areas in the lowlands. General observations indicate that the changes resulting from fire do not differ from those in the upland discussed elsewhere. The timbered areas are most affected and return to their normal state very soon or by the introduction of stages involving much deciduous woods, chiefly *Populus tremuloides* according to the nature of the fire.

The cutting of the *Calamagrostis* meadow around the Government Dog Camp on lake Mamawi has simply given the miscellaneous group of plants normally found scattered along the willow margins a chance to spread abundantly. The camp has not been established long enough for the introduction of other species.

Primary sp.	*Potentilla Anserina*
Secondary spp.	*Urtica gracilis*
	Rumex mexicanus
	Anemone canadensis
	Geum macrophyllum var *perincisum*
	Urtica canadensis var *glabrata*
	Physostegia parviflora
	Achillea sibirica
	Aster junceus
	Epilobium philadelphicus
	Solidago canadensis

The repeated cutting of the sloughs at the Hay Camp has introduced many changes in the meadow vegetation. Large areas have been dominated by the tickle-grass *Agrostis scabra* which is of very little value as hay. After a few years the meadows have to be abandoned and new ones cut,

but the writer has no data as to the length of time required for the original condition to return. A study of the extensive haying areas along the Quatre Fourches would afford the information, since they have been used for many years by the people of Chipewyan. The following species grow in more or less profusion in the Hay Camp meadow along with the tickle-grass

Poa pratensis
Beckmannia Syzigachne
Fluminia festucacea
Calamagrostis canadensis
Polygonum aviculare
Rumex occidentalis
Chenopodium album
Stellaria longifolia
Ranunculus Macounii
Aretia paniculata
Brassica arvensis
Potentilla norvegica var. *hirsuta*
Geum macrophyllum var. *perincisum*
Galium trifidum
Achillea Millefolium
A. sibirica
Aster Lindleyanus
Erigeron acris var. *asteroides*
E. philadelphicus
Senecio vulgaris
S. eremophilus
S. indecorus
S. pauperculus
Cirsium Drummondii

It will be readily noted that the cutting here has had much the same effect as that at the Dog Camp, that is, the spread of "weedy" species from slough margins. With these are mixed, in all sorts of combinations, the normal vegetation of the sloughs. A few, such as the mustards are obviously foreign introductions to the region.

In the Hay Camp clearing the smart-weeds *Polygonum aviculare*, lamb's quarters *Chenopodium album*, and more introduced mustards *Thlaspi arvense*, *Capsella Bursa-pastoris*, and *Camelina sativa* have become common weeds. A small patch of alsike clover *Trifolium hybridum* has been planted and appears to be doing well. One of the most abundant weeds at the camp is a common species of open woods and prairies throughout the region, *Mertensia paniculata*.

Summary

The appended diagram, Figure 15, summarizes the foregoing treatment of the types of vegetation in the lowland areas of the Athabaska-Peace Delta region. It indicates the general trend in the development of mesophytic forests upon the various types of open ground being produced here by the ordinary physiographic processes.

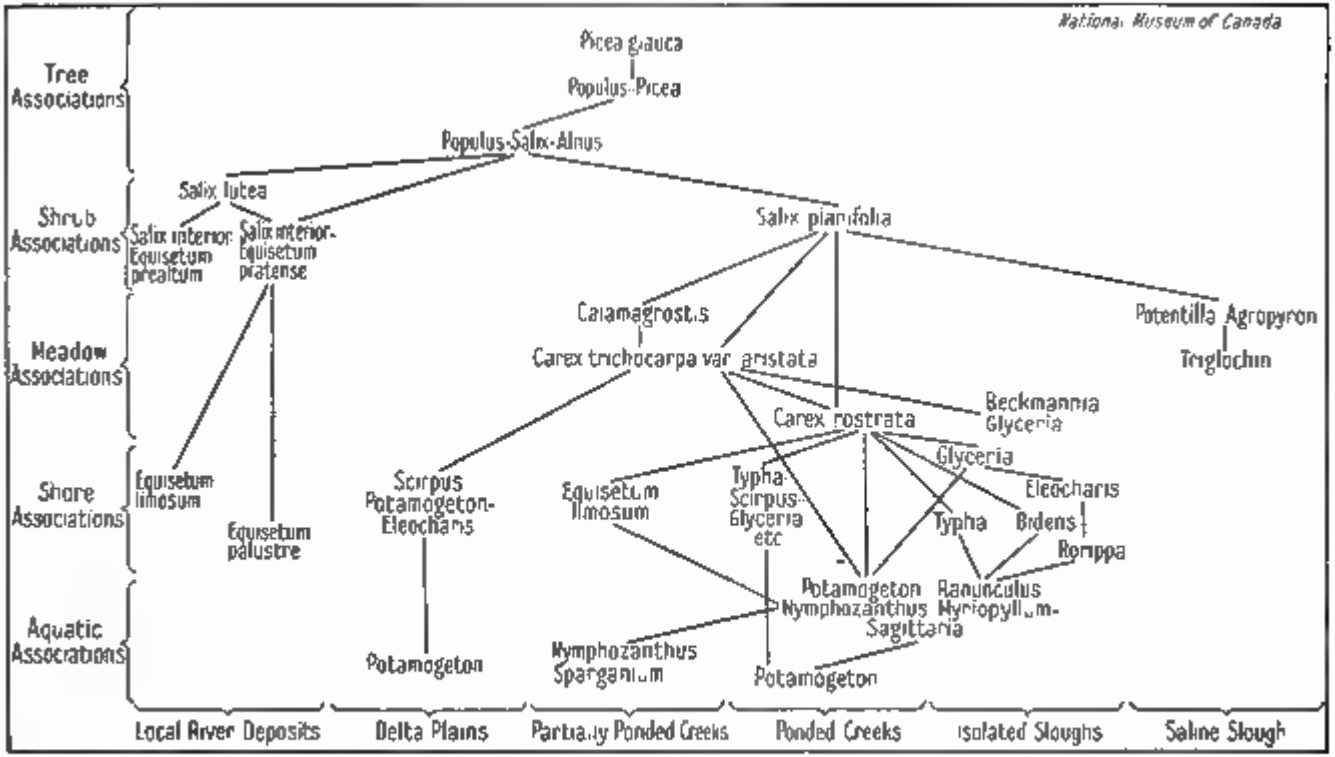


Figure 15. Outline of plant successions in the Athabaska Peace, and Slave River lowlands.

ANNOTATED LIST OF FLOWERING PLANTS AND FERNS

So far as is known at present the Wood Buffalo Park [illegible] consists [illegible] of its flora during the Pleistocene [illegible] present [illegible] the region [illegible].[1] The new flora [illegible] from widely separated [illegible] that [illegible] separated [illegible]. [illegible] the [illegible] known [illegible] the Canadian forest, the second [illegible] of species from the mountains and plains of the western and interior parts of the continent.

The larger part of the flora is made up of species in the first of these groups. The major trees are *Pinus* [illegible] *Picea* [illegible] *Populus tremuloides*, *P.* [illegible] *Betula papyrifera* [illegible] and [illegible]. With the [illegible] northwestward [illegible] Athabaska, Great Slave Lake [illegible] these species range [illegible] to Alaska. Among [illegible] *Carex* [illegible] the same wide range. The chief [illegible] arctic tendency is expressed [illegible] and [illegible] bogs.

The [illegible] may be divided into [illegible] groups. The first [illegible] from [illegible] Alaska [illegible] region and eastward to the Great Plains. [illegible] Wood Buffalo Park [illegible] *Carex* [illegible] Rosen, [illegible] and many others. A [illegible] more [illegible]. It may be illustrated by *Poa* [illegible] *Agropyron* Smithii var. [illegible]. The third group [illegible] of species from the western mountains that also range eastward to Ontario and New York and is illustrated by *Carex Richardsoni* and *C. trichocarpa* var. *aristata*.

In addition to these major elements certain marginal floras should be mentioned. A distinguishing [illegible] of the heavily timbered areas is the absence of [illegible] that are [illegible] the richer parts of the Canadian forest (53). The causes of this are thought to be [illegible] since much of the country was drained [illegible] and the retarding action of the severe climate [illegible]. The [illegible] absent element in the flora [illegible] as *Abies balsamea* [illegible] and *Aralia* [illegible] [illegible] *Streptopus* [illegible] *Habenaria* [illegible]. It is of [illegible] interest that the first [illegible] of these have now been found in the upper parts of Athabaska river, which appears to be at the present northern margin of their range. A [illegible] of the eastern edge of the Cariboo Mountains [illegible] species of the Cordilleran region such as *Pinus* [illegible] *Arctagrostis arundinacea*, *Carex* [illegible] and *Thalictrum sparsiflorum*.

[1] [illegible] The [illegible] of the Athabaska Great Slave Lake Region [illegible] 1933 [illegible]

Source materials for the following list of the vascular flora have consisted mainly of the writer's own collections. Most of these were made during the summers of 1928 29 30 and a considerable number of records [illegible] Peace-Athabaska Delta region are derived from collections made [illegible] summer of 1926 27. There are [illegible] 2,246 field numbers involving 10,057 specimens. Mr John Russell D.L.S. has kindly loaned a small [illegible] made by him in the northern area of the park during the summer of 1920. Seventy-eight numbers from this collection including 78 species have been examined by the writer and added to the list. About a dozen specimens were presented to the writer by Mrs. [illegible] of Fort Smith and have been listed accordingly. It is believed that these collections include nearly all the flowering plants and ferns known to grow in the region at the present time but with continued exploration the list cannot yet be considered [illegible] since the writer makes no pretence of having [illegible] a complete flora. A few unverified records, less than half a dozen, have been included with accompanying notes on their sources and a few [illegible] be added as [illegible] further [illegible] of earlier collections is made. This number [illegible] however since very few travellers have [illegible] the interior country and have not collected the less conspicuous [illegible]. Unless otherwise indicated the numbers cited in the list are the writer's.

Most of the collections are from that part of the park area that lies [illegible] of the 60th parallel. A few however come from neighbouring districts and may be [illegible] with regard to habitat within the area. Plants from the eastern edge of the Caribou Mountain plateau were [illegible] just outside the western boundary of the park but would probably be [illegible] a little farther to the northward where the plateau extends east of the boundary. A number of records are from Fort Smith and [illegible] and from lower Slave River district both of which are east and northeast of the boundary but they have been included for the light they may throw upon problems of distribution. Fort Smith and the Smith Portage area lie on a westward extension of the Precambrian rocks which make up the country east of Slave river and accordingly have a somewhat more boreal flora. This is related to that of various uplands and granite hills in the interior of the upper Slave River district.

The following notes will serve to explain the localities cited in the list the order in which they are here given being similar to that used in the citations. It should be understood that the figures for longitude and latitude are approximate and locate only in a general way the centres from which field work was carried on.

1) *Red Portage, Upper Embarras River.* Lat. 58° 20' Long. 111° 22'

A woodland trail about ¼ mile long between Embarras river near the point where [illegible] Athabaska and the [illegible] Mamawi creek. [illegible] trading post is at the upper end of the [illegible] has been for some years a stopping place on the winter trail between McMurray and Chipewyan. The trail leads over the portage thence through the creek and across lake Mamawi.

(2) *Cree (Mamawi) Creek*, Lat 58° 29', Long 111° 30'

Cree creek, called Mamawi creek on very recent maps, is an abandoned channel in the western part of the Athabaska delta It is about 14 miles long and has no appreciable current. It has long been used as a short route between Chipewyan and Athabaska river

(3) *Lower Delta of Athabaska River*, Lat 58° 36' 30", Long. 111° 5' 30"

A mud, sand, and driftwood deposit near the lakeward end of Embarras river, in Athabaska delta

(4) *East Shore of Lake Mamawi*, Lat 58° 35', Long 111° 22'

A delta lowland area composed of mud flats marshes, and low granite knolls A few willow clumps grow on the higher bars The presence of the granite hills, with occasional small clay deposits on them, leads to a mixture of the sub-arctic flora that prevails to the eastward with a few plants peculiar to the dry prairies.

(5) *Hay (Prairie) River*, Lat 58° 37', Long. 111° 44'.

A short sluggish stream which consists of several channels and carries the water from lake Claire to lake Mamawi through an expanse of delta lowland

(6) *Along Quatre Fourches River*, Lat 58° 40', Long 111° 20' and Lat 58° 22', Long. 111° 35'

The Quatre Fourches is a short stream flowing between Peace river and lakes Athabaska and Mamawi Near the Peace its banks are well wooded, but near the lakes it flows through low delta flats. There are several granite hills along its banks which introduce a somewhat more boreal element to the local flora Most of the collections are from two localities, one near the forks, just above lake Athabaska, and the other near Peace river A few are from the delta deposit in lake Athabaska As noted elsewhere, the Quatre Fourches, at times when the Peace is low, reverses its current and flows away from the lake

(7) *30th Base Line District, Slave River*, Lat 59° 7', Long. 111° 27'

Collections here are from the vicinity of the point at which the 30th base line crosses Slave river Part of the material is from a large island flood-plain, and part from the bank of the river itself or from abandoned channel sloughs nearby

(8) *Murdock Creek District*, Lat 59° 14', Long. 111° 34'.

Murdock creek flows with a sluggish current through a very crooked channel more or less parallel to Slave river, into which it finally empties. Most of the collections are from sloughs near it.

(9) *Government Hay Camp District, Slave River*, Lat 59° 31', Long. 111° 28'

This area is along Slave river about 27 miles above Fitzgerald. Collections are from the neighbouring hay meadow sloughs, from adjacent uplands just north and west of the camp, from occasional granite knolls and from the river bank itself

(10) *Near Heart (Raup) Lake*, Lat. 59° 41', Long. 111° 56'.

Heart lake, called Raup lake on very recent maps, is in the Salt Plain region, about 16 miles southwest of Fitzgerald. The collections recorded here are from timbered ridges and prairies about 2 miles south and east of the lake.

(11) *Fort Smith*, Lat. 60° 00' 30", Long. 111° 53'

Collections recorded thus are from the bank of the Slave river, from the village itself and from nearby sloughs and upland woods. A few numbers are from the Smith Portage road near its eastern end, and from the vicinity of upper Smith rapids near Fitzgerald.

(12) *Near Mission Farm*, Lat. 59° 57' 30", Long. 112° 17'

This area is along Salt river about 20 miles by road southwest of Fort Smith. The Roman Catholic Mission maintained a farm there for many years raising cattle and hardy grains. The collections recorded are from the Salt Plains between the farm and the brine springs which lie at the base of the Salt Mountain escarpment.

(13) *Salt Mountain*, Lat. 59° 53', Long. 112° 23'

Salt mountain is a limestone escarpment overlooking the Salt Plains to the west of Mission Farm. The collections are from the timbered upland.

(14) *Pine Lake District*, Lat. 59° 34', Long. 112° 15'

Most of the collections thus recorded were obtained within a radius of 5 miles of the lake, in sloughs, meadows, upland timber, and on lake shores.

(15) *Observation Ridge, About 10 Miles South of Pine Lake*, Lat. 59° 27', Long. 112° 20'

A few numbers collected at this place are from a burned-over muskeg and gravel ridge area. It is a camping site on the pack trail between Pine lake and Peace point.

(16) *Round Lake, About 18 Miles South of Pine Lake*, Lat. 59° 20', Long. 112° 23'

This is a small sink-hole pond along the trail between Pine lake and Peace point. It has a fluctuating water-level and a sandy margin. A nearly complete collection of its marginal vegetation was made.

(17) *Peace Point*, Lat. 59° 7', Long. 112° 26'

Peace point is at a bend in Peace river where the bank consists of gypsum cliffs on the top of which is a semi-open prairie area. A short distance back from the river is an older bank, likewise composed of gypsum. The whole area is spotted with sink-holes, some of which are dry, whereas others contain sloughs. Collections are from the prairies, the older and more recent river banks, and from local flood-plain deposits on the lower side of the point. The spot has been a favourite camp site and meeting ground for generations of Indians and white men.

(18) *Sink-hole Slough, 18 Miles East of Moose Lake,* Lat. 59° 30′ 20″, Long. 112° 43′ 30″.

This is a large sink-hole with sandy banks and a stream running into a pond at its lowest part. A wide variation in habitats occurs, from dry, unstable, sandy slopes to wet sloughs. The distance from Moose lake is by the pack trail that leads to Pine lake.

(19) *Moose (Eight) Lake,* Lat. 59° 36′, Long. 113° 7′.

The position given here is approximately that of the ranger station about 1½ miles from the eastern end of the lake. The collections are from various habitats within a radius of 5 miles from this point. Moose lake is known as Eight lake on the most recent maps.

(20) *Indian Graveyard, Peace River,* Lat. 58° 42′ 30″, Long. 113° 51′

The collections are from the woods along the river, from various abandoned channel sloughs in the vicinity, and from a nearby poplar bluff. The locality is about 6 miles east of the western boundary of the park, and about 150 miles (by the river) above the Slave. It is a popular Indian rendezvous, at the southern end of a pack trail that leads around the base of Caribou mountains to the Jackfish Lake country.

(21) *Base of Eastern Slope of Caribou Mountains,* Lat. 58° 57′, Long. 113° 55′, and Lat. 58° 51′, Long. 113° 57′

The collections are from two localities, as noted. One is about 11 miles north of the Peace and the other is about 18 miles. Woods and semi-open prairies make up most of the habitats.

(22) *Eastern Edge of Caribou Mountain Plateau,* Lat. 58° 54′, Long. 114° 9′, and Lat. 58° 51′, Long. 114° 9′

Most of the collections are from the first of the two localities cited, and are from upland timber and muskeg areas. Both places are reached from the 11-mile prairie district, and are just west of the western boundary of the park.

(23) *Nimshih Hills,* Lat. 59° 45′, Long. 113° 7′.

The locality given here is approximately that at which Little Buffalo river cuts through the range of hills.

(24) *Lower Slave River*

The few collections recorded thus are mainly from the banks of the stream not far below Grande Detour, about 60 miles below Fort Smith.

(25) Localities cited by Russell

Little Buffalo River mainly that part of the river between Lobstick creek, west of Salt River settlement and Nyarling river.

Sass Creek, Bear Cleur, and Nyarling Rivers all western tributaries of the Little Buffalo, draining the northern area of the park. The Nyarling forms part of the northern boundary of the park.

Terms of frequency such as *rare occasional common* and *abundant* are self explanatory. For further notes upon the relative abundance of many species reference should be made to the general description of the vegetation given elsewhere by the writer. Terms descriptive of habitats also need little explanation but a few notes will make for clearness. *Upland* denotes all of the area above the recent flood plain and delta deposits of the major rivers and includes the rocky hills in the lowland flood plains. *Black spruce woods* denotes a spruce timber with a thick mat of mosses and very little undergrowth. *Muskeg timber* is the black spruce forest that develops on old muskegs. *Open woods* refers to the upland, white or jackpine or poplar timber that is not common in the area. *Slough* and *wet meadow* are used rather interchangeably to denote a wet depression usually covered by sedges and grasses. A *muskeg* is an undrained depression whose cover consists largely of mosses of which *Sphagnum* is the commonest.

The few notes on poisonous plants are derived largely from Dr. L. H. Pammel's extensive manual (6). A few notes upon this subject and also upon the edible qualities of certain species are from James R. Anderson's studies in British Columbia (1).

The order and delimitation of families is that presented in Engler and Gilg's Syllabus der Pflanzenfamilien (9th and 10th editions) and the arrangement of genera although generally in accord with the same work, has been changed somewhat. The Gramineae and Cyperaceae. The order used in the Gramineae is taken from Hitchcock's Genera of Grasses of the United States (8) which has been widely accepted among students of the group. Such conformity in the organization of the difficult group of the Cyperaceae has led the writer to use that of Gray's Manual, one of the most commonly known texts. So far as possible the International Rules of Botanical Nomenclature have been followed in the selection of names and only those synonyms have been included that will make the list agree with standard manuals such as Rydberg's Flora of the Rocky Mountains and Adjacent Plains, Britton and Brown's Illustrated Flora of the Northern United States and Canada and Gray's New Manual of Botany (7th edition). References to recent treatments of certain species or groups of species are given wherever they are available. The writer has made no extensive effort to obtain local common names and those given have been selected from the standard manuals because of their wide usage in other regions.

Many persons have been of assistance in the preparation of the list. The writer is most indebted to Professor M. L. Fernald of Harvard University who has given freely of his time and extensive knowledge of northern floras. Some critical groups such as *Potamogeton Carex Draba Erigeron, Antennaria Arnica* and *Taraxacum* he has made many of the determinations of different species and has kindly checked the entire list for nomenclatural errors. Dr. C. B. Jennings of the University of Pittsburgh has lent much encouragement and assistance particularly in the earlier stages of the work. Thanks are due also to Dr. J. H. Schaffner of Ohio State University who has checked the 1926-27 collections of *Equisetum* to Dr. F. W. Pennell of the Academy of Natural Sciences Philadelphia, who has verified the determinations of the Scrophulariaceae, to the late Mr. E. E.

Mackenzie, of New York, and Professor A. S. Hitchcock, of the United States Department of Agriculture, who have checked over, respectively, the 1926-27 collections of *Carex* and the Gramineae to Mr. C. A. Weatherby, of Gray Herbarium, who has checked all of the ferns and fern allies, and to Dr. I. M. Johnston, of the Arnold Arboretum, who has verified the determinations of the few specimens of Boraginaceae.

OPHIOGLOSSACEAE

Botrychium Lunaria (L.) Sw. MOONWORT.

Occasional in upland aspen woods and in small prairie openings. Young sheets were found in Pine Lake district June 22, immature sporangia July 3, and fruiting plants July 9.

Pine Lake district, No. 1452.

POLYPODIACEAE

Woodsia ilvensis (L.) R.Br. RUSTY WOODSIA.

Common in crevices on granite hills in the Athabaska-Peace delta and along upper Slave river. Found in fruit July 9 and August 15.

Along Quatre Fourches river, No. 8, Government Hay Camp, Slave river, No. 1450.

W. oregana D. C. Eat.

Apparently a rare fern in the region. Found thus far only in a moist ravine on a granite hill in the Athabaska-Peace delta.

East shore of lake Mamawi, No. 1453-a.

Cystopteris fragilis (L.) Bernh. *Filix fragilis* (L.) Gilib. BRITTLE FERN.

Common in shaded rock crevices, reaching greatest size and abundance in moist ravines. Found fruiting July 19 and August 8.

Limestone sink-hole at Peace point, No. 1454; east shore of lake Mamawi, No. 1453.

Pteretis nodulosa (Michx.) Nieuw. *Onoclea Struthiopteris* Am. auth., not Hoffm. *Matteuccia Struthiopteris* Am. auth., not Todaro. *See* Rhod. xvii, 164 (1915). OSTRICH FERN.

Common in woods along lower Athabaska river, but not found elsewhere in Wood Buffalo park. Collected thus far only in sterile condition.

Reed portage, upper Embarras river, No. 1448.

Cryptogramma crispa (L.) R.Br. var. **acrostichoides** (R.Br.) C. B. Clarke. *C. acrostichoides* R.Br. PARSLEY FERN.

Common in crevices on the granite hills along upper Slave river. Fruiting abundantly in August.

Government Hay Camp district, Slave river, No. 1451.

Polypodium virginianum L. *See* Rhod. xxv, 125 (1923). COMMON POLYPODY.

Common in crevices on granite hills in the Athabaska-Peace delta and along upper Slave river. Found in fruit June 9 to August 16.

East shore of lake Mamawi, No. 1456, along Quatre Fourches river, No. 10, Government Hay Camp district, Slave river, No. 1455.

EQUISETACEAE

Equisetum arvense L. COMMON HORSETAIL.

Common in woods and thickets throughout the area, occupying a great variety of habitats. Fertile stems observed June 18 in the gorge of Little Buffalo river, and June 20 in Pine Lake district.

Along Quatre Fourches river, No 45, 30th base line district, Slave river, Nos 55, 58, 62 66 Government Hay Camp district, Slave river, Nos. 1481, 1488 Fort Smith, No. 63, Pine Lake district, Nos 1482, 1489, 1490 Peace point, No 1480, sink-hole 16 miles east of Moose lake, No. 1483, Moose (Eight) Lake district, Nos. 1484, 1485, 1486, 1487.

E. pratense Ehrh. GOOSEGRASS.

Abundant in the poplar and poplar-spruce woods on river flood-plains throughout the area In such situations along Slave and lower Peace rivers it forms a dense cover on the forest floor In its early, succulent stages it is eaten with apparent relish by grazing horses. Observed in fruit June 9 to 20.

Along Quatre Fourches river, No 45, 30th base line district, Slave river, Nos. 44, 47, Government Hay Camp district, Slave river No. 1497; Fort Smith No 43, Pine Lake district, No 1493, near Round lake, about 18 miles south of Pine lake, No 1494, Peace point, No 1495, Moose (Eight) Lake district, Nos. 1496, 1498 base of eastern slope of Caribou mountains, No. 1492.

E. sylvaticum L. var **pauciramosum** Milde *See* Rhod xx, 120 (1916) WOODLAND HORSETAIL.

Common in rich spruce woods on the uplands, and in semi-open prairies at the base of Caribou mountains. Not collected in the lowland forests. Fruiting cones nearly all gone by the last week in June.

Moose (Eight) Lake district, No. 1462 base of eastern slope of Caribou mountains, Nos. 1457, 1459, 1460 eastern edge of Caribou Mountain plateau, No. 1458.

E. palustre L. MARSH HORSETAIL.

Common on very low mud bars along the rivers, where it has a trailing habit and colonizes areas that are submerged in flood times. Observed in fruit in late June and early August.

Government Hay Camp district, Slave river, No. 1470, lower Slave river, No. 40.

E. limosum L. *E. fluviatile* L. *See* Rhod xxiii, 43 (1921) SWAMP HORSETAIL.

Abundant on the slough margins of lakes and ponds, and on the muddy shores of river flood-plains Fruiting cones observed in late June and the first half of July

Lower delta of Athabaska river No. 33, east shore of lake Mamawi, No. 1473, Government Hay Camp district, Slave river, Nos. 1478, 1479; Fort Smith. No 31, Pine Lake district, No. 1477, sink-hole 16 miles east of Moose lake, No 1471, Moose (Eight) Lake district, Nos. 1475, 1476; Indian graveyard, Peace river, No. 1472, lower Slave river, Nos. 25, 26.

E. praeltum Raf. *E. robustum* A.Br. *E. hyemale* L., var. *robustum* (A.Br.) A. A. Eat. SCOURING RUSH.

Common on the higher parts of sand-bars along the main rivers, and in open sandy places on the uplands. Observed in fruit along upper Slave river June 14, but collected elsewhere only in sterile condition. Known to be poisonous to cattle and horses, especially when eaten in its mature stages.

Along Peace river near the Slave, No. 74, 30th base line district, Slave river, No. 73, Peace point, No. 1500, sink-hole slough 16 miles east of Moose lake, No. 1499.

E. variegatum Schleich. NORTHERN SCOURING RUSH.

Apparently rare in Wood Buffalo park, and confined to sandy lake shores. Fruiting stems collected July 6.

Pine lake, No. 1463.

E. scirpoides Michx.

Abundant in timbered muskegs throughout the area. In many places it makes a large part of the ground cover beneath the black spruces. Found in fruit between June 20 and August 6.

Pine Lake district, Nos. 1467, 1468, Moose (Eight) Lake district, No. 1469, base of eastern slope of Caribou mountains, Nos. 1465, 1466.

LYCOPODIACEAE

Lycopodium annotinum L. *See* Rhod. xvii, 123 (1915). STIFF CLUB-MOSS.

Occasional in rich spruce woods where it grows in a deep mat of mosses. Fruiting cones just beginning to form on July 1 in Pine Lake district, and maturing on the slopes of Caribou mountains July 12.

Pine Lake district, No. 1501, eastern slope of Caribou mountains, No. 1502.

L. complanatum L. GROUND CEDAR.

Common in dry, usually jackpine, woods on the uplands. In the older pine forests it sometimes forms dense mats which exclude nearly all other plants. Fruiting cones just beginning to form in the latter half of June, about ¾ inch long July 5, and maturing in late July.

Pine Lake district, Nos. 1504, 1505, Salt mountain, No. 1507, near sink-hole 16 miles east of Moose lake, No. 1506, eastern edge of Caribou Mountain plateau, No. 1503.

PINACEAE

Picea glauca Voss. *P. canadensis* B.S.P., not Link. *P. alba* Link. *See* Rhod. xvii, 59-62 (1915). CANADA, or WHITE SPRUCE.

The predominating forest tree throughout Wood Buffalo park. It reaches its best development on the banks of the main rivers and upon the better-drained soils of the uplands. Seventy-five foot trees, 2 feet in diameter at the base, are common in the lowlands, and larger ones, 3 feet or more in diameter, occur in localized areas in the country between Pine Lake district and Caribou mountains. A 75-foot tree measured at the Government Hay Camp was 110 years old. The uses of the Canada spruce

are legion. It supplies abundant firewood and a light, easily worked lumber. The Indians have for generations used its readily split wood for the framework of their canoes, its long fibrous roots for sewing and binding their birch-bark canoes and utensils, and its gum for making water-tight seams. Trappers, traders, and missionaries found the straight boled trees ready material for building cabins, and in later times have established sawmills for the preparation of a local lumber supply.

Along Quatre Fourches river, No. 103, 30th base line district, Slave river, No. 102, Government Hay Camp, Slave river, No. 1526, Fort Smith, No. 100, Peace point, No. 1525, Moose (Eight) Lake district, Nos. 1527, 1528, 1529.

P. mariana (Mill.) B.S.P. *P. nigra* Link. BLACK, or BOG SPRUCE.

The most abundant tree in muskeg timber, where it forms dense stands. It is rarely observed more than 5 or 6 inches in diameter, and is most commonly smaller than this. In Caribou mountains it is associated with *Pinus contorta* var. *latifolia* on clay hill tops.

Moose (Eight) Lake district, Nos. 1523, 1524, eastern edge of Caribou Mountain plateau, No. 1522.

Abies balsamea (L.) Mill. BALSAM FIR.

Rare in Wood Buffalo park, and apparently confined to the upper delta of Athabaska river. It has been reported in the gorge of Little Buffalo river (17), but the report has not been confirmed.

Reed portage, upper Embarras river, No. 1521.

Larix laricina (Du Roi) Koch. *L. americana* Michx. TAMARACK, LARCH.

Common in muskegs throughout the area. The tamarack plays only a secondary part in the muskeg timber, and rarely exceeds 8 to 10 inches in diameter. It does not appear to be flourishing, and dead trees are very commonly seen, although the cause of this has not been determined.

Pine Lake district, No. 1520, Moose (Eight) Lake district, Nos. 1518, 1519, base of eastern slope of Caribou mountains, No. 1517; Clewi river, *Russell*, No. 27.

Pinus contorta Loudon. var. **latifolia** Engelm. *P. Murrayana* Balf. *P. contorta* var. *Murrayana* (Balf.) Engelm. LODGEPOLE PINE.

Rare in Wood Buffalo park, and apparently confined to the Caribou mountains, where it is associated with black spruce on clay hill tops.

Eastern edge of Caribou Mountain plateau, Nos. 1508, 1509.

P. Banksiana Lamb. *P. divaricata* of auth. JACK, or BANKSIAN PINE.

Abundant on dry sand-plains and on sand and rock hills throughout the area. The open, park-like timber of jackpine is characteristic of large tracts on the uplands. The trees were producing enormous quantities of pollen between the middle and last of June 1928.

Near Heart (Raup) lake, No. 1512, Pine Lake district, No. 1511, Moose (Eight) Lake district, No. 1510.

Juniperus communis L., var **montana** Ait *J. sibirica* Burgsd. DWARF JUNIPER.

Common on dry, rocky hills along upper Slave river and on jackpine ridges along Bear river. In fruit about mid-August.

Government Hay Camp district, Slave river, No. 1516, Bear river, *Russell*, No. 38.

J. horizontalis Moench. *Sabina horizontalis* (Moench.) Rydb. CREEPING JUNIPER.

Common on dry prairies and rocky hills. Collected in fruit during late August.

Near Heart (Raup) lake, Nos. 1513, 1514, Fort Smith, No. 121, near Mission Farm, No. 1515, Little Buffalo and Bear rivers, *Russell*, No. 34.

TYPHACEAE

Typha latifolia L. CAT-TAIL.

Common on the shores of lakes and ponds, where its stout rootstocks are colonizing shallow water. In flower in late July and in fruit by mid-August. Muskrats feed extensively on the rootstocks.

Cree (Mamawi) creek, No. 1530, lower delta of Athabaska river, No. 126, Murdock Creek district, No. 1533, near Heart (Raup) lake, No. 1532; Moose (Eight) Lake district, No. 1531.

SPARGANIACEAE

Sparganium eurycarpum Engelm. *See* Rhod. xxiv, 26 (1922) BROAD-FRUITED BUR-REED.

Common at the margins of ponds and slow streams in Athabaska-Peace delta. Young shoots were collected in mid-June, immature fruits in late July, and fully mature fruits August 15.

Cree (Mamawi) creek, No. 1540, 30th base line district, Slave river, No. 128, Murdock Creek district, No. 1541.

S. multipedunculatum (Morong) Rydb. *See* Rhod. xxvii, 190 (1925).

The commonest bur-reed in the park area. It is most abundant at the margins of lakes, sloughs, and slow streams. Collected in flower during the last week in July, and in fruit during the third week in August.

Cree (Mamawi) creek, No. 1535, Murdock Creek district, No. 1536; Moose (Eight) lake, Nos. 1537, 1538.

S. angustifolium Michx. *See* Rhod. xxiv, 26 (1922) NARROW-LEAVED BUR-REED.

Occasional in ponds and slow streams. Flowers collected in late July and immature fruits August 1.

Murdock creek, No. 1544, Pine Lake district, No. 1543, Indian graveyard, Peace river, No. 1542.

S. minimum Fries.

Apparently rare in Wood Buffalo park, and found only at the margin of an upland muskeg pond. In flower July 9.

Pine Lake district, No. 1539.

Potamogeton gramineus L., var graminifolius Fries. *P heterophyllus* of most recent Am auth., not Schreb. *See* Rhod. xxiii, 189 (1921). PONDWEED.

Common in shallow lakes and slough ponds, and abundant in the lower deltas of Athabaska and Peace rivers. Collected in fruit during late July and the first three weeks of August.

East shore of lake Mamawi, No. 1548; Murdock Creek district, No. 1546, Fort Smith No. 135, Moose (Eight) Lake district, No. 1545; Indian graveyard, Peace river, No. 1547.

P. praelongus Wulf

Common in the deeper water off-shore in relatively shallow lakes. Fruiting in mid-August.

Murdock Creek district, No. 1572, Moose (Eight) lake, Nos. 1571, 1570.

P. Richardsonii (A. Bennett) Rydb.

Abundant in shallow lakes and slough ponds throughout Wood Buffalo park. In lake Mamawi it is associated with *P. vaginatus* in the great patches of weed that clog the broad expanse of shallow water. Flower buds collected June 16, flowers June 26, and mature fruits from late July to the third week in August.

Lake Mamawi, No. 1551, 30th base line district, Slave river, No. 134. Murdock Creek district, No. 1556, Pine Lake district, Nos. 1557, 1559, Moose (Eight) Lake district, Nos. 1553, 1554, 1555, 1560, sink-hole 16 miles east of Moose lake, No. 1552, Indian graveyard, Peace river, No. 1558.

P. zosteriformis Fernald. *See* Mem. Gray Herb. iii 36–40 (1932)

Apparently common in shallow marshy lakes and slough ponds. Fruiting specimens collected in late July and early August.

Murdock Creek district, No. 1565, Moose (Eight) lake, Nos. 1566, 1567.

P. Friesii Rupr.

Apparently common in shallow lakes and slough ponds. Fruiting in late July.

Murdock Cree district, No. 1564; Moose (Eight) lake, No. 1563.

P. pusillus L., var polyphyllus Morong.

Collected, thus far only in an abandoned stream channel in the Athabaska delta. In fruit in mid-August.

Cree (Mamawi) creek, No. 1569.

P. panormitanus Biv.

Probably common on the shallow marshy shores of lakes.

Moose (Eight) lake, No. 1568.

P. foliosus Raf. var **Macellus** Fernald *See* Mem Gray Herb. ii, 46-51 (1932)

Common in shallow lakes and ponds. Collected in fruit during the third week in August.

30th base line district, Slave river, No. 132, sink-hole 16 miles east of Moose lake, No. 1561, Moose (Eight) lake, No. 1562.

P. vaginatus Turcz. *See* Rhod. xviii, 131 (1916), and xx, 191 (1918)

Common in shallow marshy lakes, and abundant in the open shallow water of lake Mamawi, where, with *P. Richardsonii*, it forms most of the large patches of weed. Flowers collected June 26 and fruits in mid-August.

Lake Mamawi, No. 1549, Pine Lake district, No. 1550.

P. filiformis Pers., var **borealis** (Raf.) St. John. *See* Rhod. xviii, 134 (1916).

Common on sandy bottoms of shallow lake margins. Immature fruits collected July 3, and mature ones August 14.

Pine lake, Nos. 1573, 1575, Moose (Eight) lake, No. 1574.

P. filiformis Pers., var **Macounii** Morong. *See* Rhod. xviii, 136 (1916)

Probably common in shallow lakes and slow streams. Found growing in the noticeably brackish water of Salt river. Immature fruits collected June 26.

Near Heart (Raup) lake, No. 1577, Pine Lake district, No. 1576.

P. pectinatus L.

Probably common in shallow lakes that have sand or gravel bottoms. Fruiting specimens collected in mid-August.

Moose (Eight) lake, No. 1578.

NAJADACEAE

Najas flexilis (Willd.) Rostk. and Schmidt. NAIAD.

Occasional on shallow sandy margins of lakes. Collected in fruit August 14.

Moose (Eight) lake, No. 1579.

SCHEUCHZERIACEAE

Triglochin maritimum L. ARROW GRASS.

Common in semi-alkaline muskegs, sloughs, and wet prairies, and abundant in saline flats on the Salt Plains. Flowers found between mid-June and mid-July, and mature fruits during the first half of August.

Government Hay Camp district, Slave river, No. 1586, near Heart (Raup) lake, No. 1585, near Mission Farm, No. 1582; Pine Lake district, No. 1584, Moose (Eight) Lake district, No. 1583, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 10.

T. palustre L. MARSH ARROW GRASS.

Occasional in wet meadows on the upland. Observed in flower July 14, immature fruit July 25, and mature fruit during the third week in August.

Along the trail between the Heart Lake district and Fitzgerald, No. 1580, near Round lake, about 18 miles south of Pine lake, No. 1581.

ALISMACEAE

Sagittaria cuneata Sheldon *S. arifolia* Nutt. ARROW-LEAF, or ARROW-HEAD.

Occasional in the shallow ponds and slow streams in the upland districts and common to similar situations in the lowlands. Sometimes found on mud flats where it has normal fleshy leaves, and at other times in deep water where its leaves are long and ribbon-like, reaching to the surface. Flowers in July and fruits in late August.

Cree (Mamawi) creek, No. 1587 lower delta of Athabaska river, No. 393 Murdock Creek district, Nos. 1589, 1591, sink-hole 16 miles east of Moose lake, No 1590 Indian graveyard, Peace river, No. 1588, Sass creek, *Russell*, No. 24.

GRAMINEAE

Bromus ciliatus L. BROME-GRASS

Common, but apparently limited to prairie openings and open places along Peace river Young spikelets collected July 17, and flowers August 1 Indian graveyard Peace river, No. 1671, base of eastern slope of Caribou mountains, No 1670.

B. Pumpellianus Scribn.

A common grass of dry prairies and ridges throughout the upland sections of the park It becomes abundant in cabin clearings and everywhere serves as an important element in the natural forage. Young spikelets appear in the last week of June, and flowers during July. When in flower its large yellow anthers and purplish glumes and lemmas make a striking appearance.

Fort Smith. No 204 Pine Lake district, Nos. 1675, 1677, Peace point, Nos. 1673, 1676, Moose (Eight, Lake district No. 1674, base of eastern slope of Caribou mountains, No 1672.

Festuca saximontana Rydb. SHEEP'S FESCUE.

Occasional in the driest parts of the upland prairies, on dry sand ridges, and in the more sterile crevices on granite hills. Very young panicles formed in late June, flowers during July and fruit in the middle part of August.

East shore of lake Mamawi, No 1669, near Heart (Raup) lake, No. 1667, Fort Smith No 168, base of eastern slope of Caribou mountains, No. 1668.

Glyceria striata (Lam.) Hitchc. *G. nervata* (Willd.) Trin. of auth. See Proc. Biol. Soc. Wash., xli, 157 (1928), and Rhod. xxx, 47 (1929)

Apparently rare in the park area and confined to the rich woods in the upper Athabaska delta. In fruit in mid-August.

Reed portage, upper Embarras river, No. 1620.

G. grandis Wats. *Panicularia grandis* Nash REED MEADOW-GRASS.

Common in wet meadows along upper Slave river It is usually found in the wetter central parts of the sloughs, where it often forms pure stands, readily distinguished in early August by the mass of purple made by its large panicles. It has good forage value, but is usually so local and in-

accessible that it becomes of little importance. Young spikelets are formed early in July and fruit in late July and the first half of August.

Mardock Creek district, No. 1616, Government Hay Camp district, Slave river, No. 1610.

C. paucicella (Nash) A.Sch. *Puccinellia paucicella* Nash.

Common in sloughs and wet meadows, mainly in the upland sections of the park. Flowering and fruiting similar to the last.

Lower delta of Athabaska river, No. 200, Government Hay Camp district, Slave river, No. 1611, Peace point, No. 1617, Moose (Eight) Lake district, Nos. 1614, 1615, base of eastern slope of Caribou mountains, Nos. 1612, 1613, along Little Buffalo river, *Russell*, No. 44.

C. borealis Nash. Batchelor. *Puccinellia borealis* Nash. Northern Marsh-grass.

Occasional in wet sloughs throughout the region. In flower in mid-July and early August, and in fruit during the third week in August.

Lower delta of Athabaska river, No. 202, Government Hay Camp, Slave river, No. 1618, sink-hole 16 miles east of Moose lake, No. 1619.

Puccinellia Nuttalliana (Nutt.) Wats. and Coult. *P. airoides* (Schultes) Hitchc. Alkali-grass.

Found only in the Athabaska River delta and at the margins of saline flats on the Salt Plains. In the latter situation it is a dominant species in continuous bands around the barren flats, and is said to be very attractive to grazing stock. Young flowers collected July 11, and fruit August 19.

Lower delta of Athabaska river, No. 199, near Heart (Raup) lake, No. 1784.

Phalaris *festucacea* (Willd.) Hitchc. *Scolochloa festucacea* (Willd.) Link.

A common species in wet meadows and at lake margins throughout the area. It forms nearly pure stands in local areas, and occupies situations of widely varying degrees of wetness. On the margins of Moose lake it grows in 3 to 4 feet of water and is one of the first colonizers on the marshy shore. It occupies similar situations in the outer deltas of Peace and Athabaska rivers, but in the hay meadow sloughs such as occur at the Government Hay Camp it is growing in relatively dry places, where it adds substantially to the hay crop. Collected in flower in late July, and in fruit during the third week in August.

Cree (Mamawi) creek, No. 1601, east shore of lake Mamawi, No. 1600, Mardock Creek district, No. 1599, Government Hay Camp district, Slave river, No. 1604, near Heart (Raup) lake, No. 1602, Moose (Eight) lake, No. 1603.

Poa pratensis L. June-grass, Kentucky Blue-grass.

A common grass of damp meadows, prairies, and open woods throughout Wood Buffalo park. In many parts of the prairies at the eastern base of Caribou mountains it becomes very abundant and shares dominance with *Calamagrostis canadensis*. It is one of the most important range grasses in the district. Young spikelets are formed in the latter part of June and flowering continues through most of July. Fruits appear in late July and in August.

East shore of lake Mamawi, No. 1715, 30th base line district, Slave river No. 146, Murdock Creek district, No 1717; Government Hay Camp district, Slave river, Nos 1721, 1726, near Heart (Raup) lake, No. 1722; Fort Smith, Nos. 149 152 Pine Lake district, Nos. 1718, 1720, 1723, 1724, 1729, Peace point, Nos. 1719, 1727, 1728, sink-hole 16 miles east of Moose lake, No 1733, Moose (Eight) Lake district, Nos. 1730, 1731, 1732. 1734, 1735 base of eastern slope of Caribou mountains, Nos. 1714, 1716 eastern edge of Caribou Mountain plateau, No. 1713.

P COMPRESSA L. CANADA BLUE-GRASS.

Collected only at Fort Smith, where it is probably introduced. Fort Smith, No. 142.

P. palustris L. *P. triflora* of auth. *See* Rhod. xviii, 235 (1916) FOWL MEADOW-GRASS.

Common in wet sloughs throughout the area. Early flowering culms were found eaten by the buffalo in the latter part of June Flowers occur through July, and fruit in August.

Lower delta of Athabaska river, Nos. 143, 144, east shore of lake Mamawi, Nos 1707, 1710, Pine Lake district, No. 1711, Indian graveyard, Peace river Nos. 1708, 1709.

P. glauca Vahl SPEAR-GRASS.

Common on dry, sandy banks and ridges, and in dry crevices on rocky hills throughout the region. Also found in the driest prairies and in sandy buffalo wallows. Not abundant enough to contribute much to the range. Young spikelets collected in the latter part of June, flowers during July, and fruit in August.

East shore of lake Mamawi, Nos 1745, 1746, 1747, Government Hay Camp district, Slave river No. 1743, Fort Smith, No. 160, Pine Lake district. Nos. 1739, 1740, 1742 Moose (Eight) Lake district, Nos. 1736, 1737, Peace point, Nos. 1738, 1741 base of eastern slope of Caribou mountains, No. 1744.

P. arida Vasey

Apparently occasional, and limited to the drier parts of the Salt Plain prairies. Old flowers collected August 20.

Near Heart (Raup) lake, No. 1712.

P. glaucifolia Scribn. and Williams.

Apparently rare in the park area, and found thus far only in dry soils on granite hills in the Athabaska-Peace delta. In fruit August 9.

East shore of lake Mamawi No. 1748.

Distichlis stricta (Torr.) Rydb. *See* Rhod. xxvii, 67 (1925) SALT-GRASS.

Common on saline flats and prairies in the Salt Plain regions. Flowers collected August 20.

Near Heart (Raup) lake, No. 1794.

Phragmites communis Trin var **Berlandieri** (Fournier) Fern. See Rhod xxxiv, 211 (1932) REED-GRASS.

Common in parts of the Peace-Athabaska Delta region where it grows on marshy shores with its culms overhanging the sluggish streams. Found fruiting in late August.

Delta of Athabaska river, No. 1706.

Schizachne purpurascens (Torr.) Swallen. *Avena stricta* Michx. *Bromchon stricta* (Michx.) Farwell. *Melica purpurascens* (Torr.) Ritchie. PURPLE OAT.

Common in open poplar woods and prairies throughout the upland districts. Its tender leaves and culms add substantially to the forage during the summer months, and make up a large part of the naturally scant feed in the open woods. In some parts of the prairies it becomes abundant and dominates the turf over local areas, thus being one of the more important range grasses. Young flowers are formed the last third of June or early in July, and fruits in the latter part of July and August.

Near Heart (Raup) lake, No. 1592, Pine Lake district, Nos. 1595, 1597, 1598, Peace point, No. 1596, base of eastern slope of Caribou mountains, Nos. 1593, 1594.

Agropyron Smithii Rydb. var. **molle** (Scribn. and Smith) Jones.

Apparently rare in Wood Buffalo park, and collected only on drier parts of the Peace Point prairie. In flower July 17.

Peace point, No. 1822.

A. trachycaulum (Link) Malte var. **typicum** Fern. *A. tenerum* Vasey. See Rhod. xxxv, 161-82 (1933) and xxxvi, 417 (1934), for treatment of this and the following. SLENDER WHEAT-GRASS. WESTERN RYE-GRASS.

A common grass of open woods, semi-open prairies, and the drier parts of meadow sloughs throughout the region. It supplies excellent forage in considerable quantities. Found in early flowering stages from the middle to the last of July, and in fruit during the third week in August.

East shore of lake Mamawi, Nos. 1818, 1819, Government Hay Camp district, Slave river, Nos. 1810, 1811, near Heart (Raup) lake, No. 1812, Round lake, about 18 miles south of Pine lake, No. 1817, Peace point, Nos. 1814, 1815, 1816, 1821, sink-hole 16 miles east of Moose lake, No. 1813, Moose (Eight) Lake district, Nos. 1808, 1809, Indian graveyard, Peace river, No. 1820, base of eastern slope of Caribou mountains, No. 1823.

A. trachycaulum (Link) Malte var. **molleiorale** (Vasey) Malte. *A. Richardsonii* (Trin.) Schrad.

Common on upland semi-open prairies and in the drier parts of meadow sloughs. Young spikelets just forming during the third week in July, and flowering during the middle part of August.

Government Hay Camp district, Slave river, Nos. 1797, 1798, near Heart (Raup) lake, No. 1799, Moose (Eight) Lake district, No. 1796; Peace point, Nos. 1800, 1801, base of eastern slope of Caribou mountains, No. 1805.

Elymus innovatus Beal. WILD RYE.

A common grass of dry upland woods and prairies. It is the primary herbaceous species in the scant ground cover of the vast tracts of upland aspen woods, and as such is one of the most important sources of forage in the summer feeding grounds of the buffalo. It does not make a thick turf, but its long slender leaves and culms appear rather early in the season, before the semi-open prairies have had time to produce much new green material, so that it helps to tide the herds over the difficult spring feeding period. Young spikelets are produced during the last week in June, and the plants are in full flower during July. Fruit is matured in the latter half of August.

Government Hay Camp district, Slave river, Nos. 1651, 1658, Fort Smith, Nos. 183, 185. Pine Lake district, Nos. 1654, 1655, 1656, Peace point, No. 1657. Moose (Eight) Lake district, Nos. 1646, 1652, 1653, 1659; Indian graveyard, Peace river, No. 1647, base of eastern slope of Caribou mountains, Nos. 1649, 1650, eastern edge of Caribou Mountain plateau, No. 1648.

E. Macounii Vasey.

Known in the park area only from the following specimen.

Salt River region, Camsell, No. 92018.

Hordeum jubatum L. SQUIRREL-TAIL GRASS.

A common grass of prairie slough margins and cabin clearings. It becomes abundant on the edges of shallow salt flat depressions in the Salt Plains, where broad bands of it are made especially noticeable by its waving, plume-like heads. In the early stages of growth it furnishes considerable forage, but when the fruits begin to mature the long barbed awns become embedded in the tender flesh about the mouths and noses of grazing stock and often cause sores. Young inflorescences are produced early in July and fruit in late July or August.

East shore of lake Mamawi, No. 1630, near Heart (Raup) lake, No. 1631, Pine Lake district, No. 1633, Peace point, No. 1634, sink-hole 16 miles east of Moose lake, No. 1632, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 14.

H. vulgare L. CULTIVATED BARLEY.

Found only where it has escaped from cultivation. Successfully grown at various places such as the Mission Farm, southwest of Fort Smith. Fruits mature during the first half of August.

Government Hay Camp, Slave river, No. 1635.

Koeleria cristata (L.) Pers. JUNE-GRASS.

One of the dominant grasses in the drier prairies on the uplands, and an important source of forage. Collected in flower during mid-July, and with immature fruit the third week in August.

Near Heart (Raup) lake, No. 1681, Peace point, Nos. 1680, 1682; base of eastern slope of Caribou mountains, Nos. 1678, 1679.

Trisetum spicatum (L.) Richter, var **molle** (Michx.) Beal *T. subspicatum* (L.) Beauv., var. *molle* Gray *See* Rhod. xvii (1916), and xxx, 239 (1928) Downy Oat-grass.

Occasional in dry upland woods. Young spikelets produced late in June, and flowers during early July.

Pine Lake district, Nos. 1700, 1701, eastern edge of Caribou Mountain plateau, No. 1699.

Sphenopholis pallens (Spreng.) Scribn. Shining Prairie-grass.

Occasional on sandy shores of lakes and streams. Young spikelets collected in early July and flowers during the third week in July.

Pine lake, No. 1825, Peace point, No. 1824.

Avena Hookeri Scribn. Hooker's Oat.

Apparent rare in the park, though rather common on the drier parts of the Peace Point prairie. In fruit August 2.

Peace point, No. 1636.

A. fatua L., var. **glabrata** Peterm. Wild Oats.

Found only in the hayfield at the Government Hay Camp, where it is introduced. In fruit August 4.

Government Hay Camp, Slave river, No. 1638.

A. sativa L. Cultivated Oats.

Successfully cultivated in Fort Smith, at the Mission Farm along Salt river, and at the Government Hay Camp. Fruits mature in early August.

Government Hay Camp, Slave river, No. 1637.

Deschampsia caespitosa (L.) Beauv., var. **glauca** (Hartm.) Lindm. *Aira caespitosa* L. *See* Rhod. xxviii 154 (1926) Tufted Hair-grass.

Common about the margins of wet sloughs and on damp, muddy shores. In flower during the last part of July and the first three weeks of August. Fruit matured in late August.

Delta of Quatre Fourches river, No. 216, Murdock Creek district, No. 1662, Government Hay Camp district, Slave river, Nos. 1660, 1664, near Heart (Raup) lake, Nos. 1661, 1666, Peace point, No. 1665; Moose (Eight) Lake district, No. 1663.

Danthonia intermedia Vasey Wild Oat-grass.

Occasional in dry upland prairies where it adds to the forage, but not to such an extent as to be important. In flower during the third week in July, and in fruit the third week in August.

Near Heart (Raup) lake, No. 1683, Peace point, Nos. 1684, 1685.

Calamagrostis purpurascens R.Br. Alpine Reed-grass.

Common on dry, sandy ridges throughout the upland. Collected in flower July 13, and in immature fruit August 17. Very young spikelets appear during the last week in June.

Fort Smith, No. 260, Moose (Eight) Lake district, Nos. 1768, 1769.

C. montanensis Scribn. MONTANA REED-GRASS.

Apparently rare in the park area and confined to the drier parts of prairies. In flower July 19.

Peace point, No. 1770.

C. canadensis (Michx.) Nutt. *See* Rhod. xxiv, 122 (1922) BLUE-JOINT.

This species with its variety *robusta*, is probably the most important source of wild hay and forage that the region affords. It is abundant in the moister parts of the upland semi-open prairies at the willow margins of the extensive abandoned channel sloughs of the river bottoms, and on the wide expanses of meadow in the lower delta districts. In the upland prairies and river deltas it predominates over thousands of acres, to the exclusion of nearly all other vegetation. The inhabitants of Chipewyan have for many years made hay in the Quatre Fourches division of the Peace delta, utilizing the rich growth of this grass. In the same region it is one of the most valuable sources of autumn and winter forage for the buffalo. Young spikelets appear in late June and flowers during July and early August.

East shore of Lake Mamawi, Nos. 1755, 1756, 1757. Government Hay Camp district, Slave river, Nos. 1751, 1753. Moose (Eight) Lake district, Nos. 1749, 1750, 1752. Indian graveyard, Peace river, No. 1759, base of eastern slope of Caribou mountains, Nos. 1754, 1758, lower Slave river, Nos. 231, 232.

C. canadensis (Michx.) Nutt., var **robusta** Vasey. *See* Rhod. xxiv, 122 (1922), and xxxii, 42 (1930). BLUE-JOINT.

Similar to the species in distribution and habits.

Round lake, about 18 miles south of Pine lake, No. 1762, Peace point, No. 1761, Moose (Eight) Lake district, Nos. 1763, 1764, base of eastern slope of Caribou mountains, Nos. 1760, 1765, 1766, eastern edge of Caribou Mountain plateau, No. 1767.

C. inexpansa A. Gray, var **brevior** (Vasey) Stebbins. *See* Rhod. xxxii, 50 (1930). REED-GRASS.

The writer's material shows wide variation in the size and form of the inflorescence and may contain more than one variety of *C. inexpansa*. Also, part of it is separable only with difficulty from *C. neglecta*.

Common in semi-open prairies and on the slough margins of lakes and ponds. It is abundant on the Salt Plain prairies near Heart lake, where it shares dominance over large areas with *Juncus balticus*. It is of note that though it is so common on that part of the upland that lies east of Jackfish river, it is not found at all in the prairies at the base of Caribou mountains. In regions where it is abundant it is a valuable forage grass. Early flowers appear in mid-July, and fruits in late August.

Murdock Creek district, Nos. 1777, 1778, Government Hay Camp district, Slave river, No. 1773. Peace point, Nos. 1771, 1772. near Heart (Raup) lake, Nos. 1774, 1775, sink-hole 16 miles east of Moose lake, No. 1783, Moose (Eight) Lake district, Nos. 1776, 1779, 1780, 1781, 1782.

Agrostis scabra Willd. *See* Rhod xxxv 207-12 (1933) HAIR-GRASS, or TICKLE-GRASS.

Common in prairie openings and the drier parts of meadow sloughs In the meadow at the Government Hay Camp, where the wild hay has been cut from the same plots for several consecutive years, this species becomes a predominating grass, greatly reducing the value of the hay In flower from the middle to the last of July and sometimes later Fruiting in August.

East shore of lake Mamawi, Nos. 1624, 1625, Murdock Creek district, No 1627, Government Hay Camp, Slave river, No. 1626, near Heart (Raup) lake, No 1621, Round lake, about 18 miles south of Pine lake, No 1628, sink-hole 16 miles east of Moose lake, No. 1629, base of eastern slope of Caribou mountains Nos. 1622, 1623, Clewi river, *Russell*, No 17

Cinna latifolia (Trev.) Griseb. WOODLAND REED-GRASS.

Rare in Wood Buffalo park, and apparently confined to the deep woods in the upper Athabaska delta. Fruits immature in mid-August.

Reed portage, upper Embarras river, No 1827

Arctagrostis arundinacea (Trin.) Beal.

Rare in this region, and apparently confined to Caribou mountains, where it inhabits wet muskegs Collected in flower July 12.

Eastern edge of Caribou Mountain plateau, No. 1826.

Alopecurus aequalis Sobol *A. aristulatus* Michx. *A. geniculatus* L., var. *aristulatus* (Michx.) Torr MEADOW FOXTAIL.

Occasional in a variety of habitats, but usually found on muddy shores and in semi-dry sloughs. Rather common in clearings and buffalo wallows. Young flowers observed June 22, flowers during July, and both flowers and fruit during the first two weeks of August.

Reed portage, upper Embarras river, No. 1607, lower delta of Athabaska river, No. 187, east shore of lake Mamawi, No 1605, Government Hay Camp district, Slave river, No 1606 Fort Smith, No. 188, Pine Lake district, No 1608, sink-hole 16 miles east of Moose lake, No. 1609, Sass creek, *Russell*, No. 73.

Phleum alpinum L. MOUNTAIN TIMOTHY

Occasional, and found only in the river lowlands. In flower during the first half of August.

Reed portage, upper Embarras river No. 1790, Government Hay Camp district, Slave river, No. 1791

P. pratense L. TIMOTHY

Introduced in settlements and cabin clearings. Young flowers observed in early July

Pine Lake district, No. 1792

Muhlenbergia Richardsonii (Trin.) Rydb. *See* Bull Tor Bot Club xxxii 600 (1905)

Collected only at the margins of saline flats on the Salt Plains In fruit August 19.

Near Heart (Raup) lake, No. 1793.

Oryzopsis asperifolia Michx. MOUNTAIN RICE.

Occasional in the upland aspen woodlands. Makes good feed, but is not common enough to be of importance. Immature fruits collected July 3, and mature ones later in the month.

Pine Lake district, Nos. 1787, 1788.

O. pungens (Torr.) Hitchc.

Occasional in dry, upland woods. Flowers collected June 9 and 17, and fruits in early July.

Along Quatre Fourches river, No. 227, Pine Lake district, Nos. 1785, 1786.

Stipa comata Trin. and Rupr. DEVIL'S DARNING-NEEDLE, PORCUPINE-GRASS.

Common on the driest parts of the Peace Point prairie, but not found elsewhere in the park. It supplies good forage, but its barbed, twisted awns become a nuisance in late summer by working their way into clothing and into the fur and flesh of animals. In young fruit July 17.

Peace point, No. 1686.

S. comata Trin. and Rupr. var. **intermedia** Scribn.

Collected only in a bit of clayey prairie on a granite hill in the Peace delta, where it was fruiting in early August.

East shore of lake Mamawi, No. 1687.

S. Richardsonii Link. FEATHER-GRASS.

Collected only in the Peace Point prairie, where it is fairly common. In fruit early in August.

Peace point, No. 1688.

Beckmannia Syzigachne (Steud.) Fernald. *B. erucaeformis* Am. auth., not Host. *B. baicalensis* (W. Kurnetsow) Hultén, *See* Rhod. xxx, 27 (1928). SLOUGH-GRASS.

A characteristic grass of wet pond margins in meadow sloughs, and of low-lying delta deposits. In semi-dry sloughs it often forms pure stands, making a certain amount of forage, but these areas of abundance are usually quite small. Collected in flower during the latter half of July, and in fruit during August. Its fruits have begun to fall off by August 12.

East shore of lake Mamawi, Nos. 1639, 1640, along Quatre Fourches river, No. 194, Murdock Creek district, No. 1643, Government Hay Camp district, Slave river, No. 1644. Peace point, Nos. 1641, 1642, sink-hole 16 miles east of Moose lake, No. 1645, Sass creek, *Russell*, No. 20.

Spartina gracilis Trin. CORD-GRASS.

Apparently limited to semi-saline prairies on the Salt Plains, where it is fairly common, but on account of its roughness it probably adds little value to the forage. Collected in flower August 19.

Near Heart (Raup) lake, No. 1795, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 62.

Hierochloë odorata (L.) Wahl. *Torresia odorata* (L.) Hitchc. VANILLA-GRASS.

Common in prairie openings and damp meadows throughout the upland districts, though not sufficiently abundant to afford much pasturage.

Its spikelets are among the earliest flowers of the spring. In full flower June 10, and immature fruit by the middle of July Fruiting in late July and August.

Along Peace river near the Slave, No. 173, Pine Lake district, Nos. 1689, 1691, Peace point, Nos. 1692, 1693, sink-hole 16 miles east of Moose lake No. 1694, base of eastern slope of Caribou mountains, Nos 1695, 1696. 1697, 1698, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 53.

Phalaris arundinacea L. Reed Canary-grass.

Occasional in damp meadows in the upland districts, and common in lowland sloughs where its tall culms and broad leaves add substantially to the wild hay Found in flower during the second week in July, and in fruit during late July and August.

Cree (Mamawi) creek No. 1702, lower delta of Athabaska river, No. 198, east shore of lake Mamawi, No 1703, sink-hole near Round lake, about 18 miles south of Pine lake, No. 1704, sink hole 16 miles east of Moose lake, No. 1705.

CYPERACEAE

Carex capitata L.

Apparently rare Found thus far only in muskeg thickets along upper Salt river near Pine lake. In flower June 20 and immature fruit July 9.

Pine Lake district, Nos. 1866, 1867

C. gynocrates Wormsk.

Common in mossy muskeg timber and thickets in the upland districts. Found flowering in late June, and in fruit during July and August.

Pine Lake district, Nos. 1883, 1884, Moose (Eight) Lake district, No. 1882.

C. stenophylla Wahl.

Apparently rare in the park area, and thus far collected only in a small patch of prairie on a granite knoll in the lower Peace delta. In fruit August 9.

East shore of lake Mamawi, No. 1958.

C. Sartwellii Dewey

Apparently rare in Wood Buffalo park, and found thus far only at the margin of a sink-hole slough on the Peace Point prairie Collected with immature fruits July 21.

Peace point, No. 1915.

C. siccata Dewey

One of the commonest sedges of dry woods and prairies, where it probably makes a substantial addition to the natural forage In local areas in the upland prairies it becomes very abundant. Observed in flower during the middle and last of June and with fruit of varying degrees of maturity through July and August.

Government Hay Camp district Slave river, No 1936 Fort Smith, No. 297, near Mission Farm, No. 1932, Pine Lake district Nos. 1924,

1930, 1931, 1938. Peace point, Nos. 1934, 1935, Moose (Eight) Lake district, No. 1937, Indian graveyard, Peace river, No. 1926, base of eastern slope of Caribou mountains, Nos. 1927, 1928, 1929.

C. diandra Schrank.

Abundant on the marshy shores of upland lakes and ponds, where it forms a zone of hummocky vegetation just back of the water's edge. Immature fruits found early in July, and mature ones through the first half of August.

Pine Lake district, Nos. 1869, 1870, 1874, Moose (Eight) Lake district, Nos. 1871, 1872, 1873.

C. sychnocephala Carey

Apparently rare, and collected thus far only from a small sink-hole slough in the upland region. In flower July 14.

Round lake, about 18 miles south of Pine lake, No. 1868.

C. Bebbii Olney

Found only in the upper delta districts of the main rivers, where it inhabits damp slough margins. Immature fruits collected late in July and mature ones in mid-August.

Reed portage, upper Embarras river, No. 1959, Indian graveyard, Peace river, No. 1960.

C. tenera Dewey

Occasional on damp, upland slough margins. Immature fruit collected July 21 and mature fruit in August.

Peace point, No. 1943, sink-hole 16 miles east of Moose lake, No. 1944.

C. praticola Rydb. *C. protensa* Drejer

Common in prairie openings throughout the area. Found in various stages of flower and fruit during the latter part of July and August.

East shore of lake Mamawi, No. 1905, near Heart (Raup) lake, No. 1904, sink-hole 16 miles east of Moose lake, No. 1907, base of eastern slope of Caribou mountains, No. 1906.

C. disperma Dewey *C. tenella* Schkuhr

A diminutive but common sedge in upland muskeg thickets and sloughs throughout the region. Immature fruits collected in the first half of July, and mature ones during the latter part of July and August.

Pine Lake district, Nos. 1894, 1895, Moose (Eight) Lake district, Nos. 1891, 1893, base of eastern slope of Caribou mountains, Nos. 1890, 1892, eastern edge of Caribou Mountain plateau, No. 1889, Clewi river, *Russell*, No. 98.

C. tenuiflora Wahl.

Apparently rare in the park area, and limited to cold upland bogs. Immature fruit collected July 9.

Pine Lake district, No. 1950.

C. foliacea L.

Rare, and so far as is known, confined to muskegs on the upper slopes of Caribou mountains. Collected in fruit July 11.

Eastern edge of Caribou Mountain plateau, No. 1957.

C. canescens L., var **subfoliacea** Laestad.

Common on muskeg pond margins in the upland districts, where its tussocks of pale foliage are conspicuous. Found in flower and immature fruit from late June to mid-July, and in fruit during August.

Pine Lake district, No. 1899, Moose (Eight) Lake district, No. 1900, base of eastern slope of Caribou mountains, Nos. 1902, 1903, eastern edge of Caribou Mountain plateau, No. 1901.

C. brunnescens Poir., var **sphaerostachya** (Tuckerm.) Kükenth. See Rhod. xxviii, 163 (1926).

Occasional at upland muskeg slough margins. Flowers in late June and fruits in early August.

Moose (Eight) Lake district, No. 1896, base of eastern slope of Caribou mountains, No. 1898, eastern edge of Caribou Mountain plateau, No. 1897.

C. arcta Boott.

Common in wet thickets on the upland. Found in various stages of flower and fruit during July and August.

Near Round lake, about 18 miles south of Pine lake, No. 1952, sinkhole 16 miles east of Moose lake, No. 1953, base of eastern slope of Caribou mountains, No. 1951.

C. obtusata Liljebl.

Abundant in the driest parts of the upland prairies, where it becomes one of the dominant species over local areas. Collected in fruit during the middle part of July.

Peace point, Nos. 1945, 1947, base of eastern slope of Caribou mountains, No. 1946.

C. Rossii Boott.

Apparently rare in this region, and found thus far only in dry, upland woods along Slave river. In fruit during the latter part of June.

Fort Smith, No. 326.

C. concinna R.Br.

Occasional in upland muskeg thickets. Found in flower during the latter half of June.

Salt mountain No. 1888, Pine Lake district, Nos. 1886, 1887.

C. Richardsonii R.Br.

Apparently rare in this region, and found thus far only in the dry upland woods along Slave river. In flower during the middle part of June.

Fort Smith, Nos. 303, 1885.

C. aurea Nutt.

Occasional on damp muddy or sandy shores in the upland districts. In flower in late June and early July, fruiting in August.

Fort Smith, No 295, Pine Lake district. Nos. 1875, 1877, sink-hole 16 miles east of Moose lake, No. 1876.

C. vaginata Tausch.

Common in muskeg thickets throughout the upland districts. In flower during the latter part of June, and in fruit during late July and August.

Pine Lake district, Nos. 1918, 1920, Moose (Eight) Lake district, Nos. 1919, 1917, base of eastern slope of Caribou mountains, Nos. 1921, 1922.

C. capillaris L.

Common in muskeg thickets on the upland. In flower during late June and in fruit during July

Pine Lake district, Nos 1910, 1911, 1913, base of eastern slope of Caribou mountains, No. 1909.

C. abbreviata Prescott

Apparently rare in Wood Buffalo park, and found only in a dry watercourse in the prairies at the base of Caribou mountains. In fruit July 22.

Base of eastern slope of Caribou mountains, No. 1956.

C. limosa L.

Apparently rare, and found thus far only in cold, upland muskegs. Immature fruit collected July 9.

Pine Lake district, No. 1879.

C. paupercula Michx., var **irrigua** (Wahl.) Fernald.

Common in wet muskegs, where it sometimes forms abundant stands in masses of *Sphagnum*. Immature fruit collected July 9, and mature fruit about the middle of July

Pine Lake district, No. 1881, eastern edge of Caribou Mountain plateau, No. 1880.

C. Buxbaumii Wahl.

Occasional at the willow margins of upland prairie openings. Collected in fruit in mid July and mid-August.

Near Heart (Raup) lake, No. 1949, near Round lake, about 18 miles south of Pine lake, No. 1948.

C. Vahlii Schkuhr, var. **interalterna** (Wahlenb.) Fernald. *See* Rhod. xxxv 220-3, 398 (1933).

Apparently rare in the park area, and found thus far only in the southwestern part of the upland, where it grows in muskeg thickets and damp prairie margins. Immature fruits found July 12 and mature ones July 17.

Base of eastern slope of Caribou mountains, No. 1955, eastern edge of Caribou Mountain plateau. No. 1954.

C. [illegible] Britton.

Occasional in upland muskeg thickets. Immature fruit found July 11 and mature fruit during August.

Along Trail about 10 miles southwest of Fitzgerald. No. 1042, Pine Lake district. No. 1041. Moose (Eight) Lake district, Nos. 1039, 1040.

C. aquatilis Wahl. Water Sedge.

One of the commonest sedges on wet sandy or marshy shores throughout the region, often forming broad bands of bright green around sloughs and ponds. Its long arching rootstalk makes it one of the most prominent recorders in such habitats. It is greatly relished by the buffalo, probably for the most part in the early succulent stages of its growth. Collected in flower during the first week of June and in fruit during August.

Fort Smith, as Mamawi, No. 1041; along Quatre Fourches river, No. 338; Murdock Creek district, No. 1042; Government Hay Camp district, Slave river, Nos. 1047, 1048; near Heart (Ramp) lake, No. 1049; Pine Lake district, Nos. 1043, 1045, 1046; rock bare 16 miles east of Moose lake, No. 1054; Moose (Eight) Lake district, Nos. 1050, 1051, 1052, 1053; base of eastern slope of Caribou mountains, No. 1040.

C. [illegible] Mahl. var. **[illegible]** (Bell.) Bailey. **C. [illegible]** Spreng. Marsh Sedge.

One of the most abundant sedges in Wood Buffalo park. Although it occurs in a variety of habitats throughout, ranging from lake shores where it stands in 4 feet of water to bear's dry sloughs, it reaches its greatest abundance in the wet meadows of the inland delta and abandoned stream channels. In the latter situations it covers many square miles in the aggregate, with a nearly pure stand, and has been for many years a source of wild hay. It also forms one of the most important sources of autumn and winter feed for the buffalo. It is probable that the small winter buds that occur at the base of the current year's growth of each plant and often at the end of a decumbent stem or off-set make an essential winter nutriment to these animals during the winter. Immature fruits have been collected from late June through July, and mature fruits during August. Over large areas in the lowland meadows the plants seldom produce flowers and fruit, apparently reproducing entirely by vegetative means. It is suggested that this may be due to continued pruning of the new shoots by the grazing buffalo.

Cree Mamawi creek, No. 1037; outer delta of Athabaska river, No. 317; east shore of lake Mamawi, No. 1038; Murdock Creek district, No. 1041; Government Hay Camp district, Slave river, Nos. 1040, 1042; Pine Lake district, No. 1044; near Round lake, about 18 miles south of Pine lake, No. 1050; Peace point, No. 1052; Moose (Eight) lake, No. 1055; base of eastern slope of Caribou mountains, Nos. 1056, 1056.

C. rostrata Stokes.

An extremely variable species found at the margin of nearly every shallow pond in the region. It usually stands with the bases of the stalks in water and forms bright green bands around the outer parts of the sloughs. Collected in flower during July and in fruit during August.

Cree (Mamawi) creek, No. 1028; Murdock Creek district, No. 1034; Government Hay Camp district, Slave river, Nos. 1030, 1030; Pine Lake

district, No 1839, Round lake about 18 miles south of Pine lake, No. 1837 Peace point, No. 1835, sink-hole 16 miles east of Moose lake, No. 1836 Moose (Eight) Lake district, Nos 1831, 1832, 1833, Indian graveyard Peace river, No. 1829, lower Slave river, Nos. 274, 277, lower Little Buffalo river, *Russell*, No. 22.

C. retrorsa Schwein.

Apparently rare in the park area. Found thus far only along Peace river just inside the western boundary, where it inhabits wet slough margins. Collected in flower July 31

Indian graveyard, Peace river, No. 1961

Eleocharis palustris (L.) R. and S. SPIKE-RUSH.

Abundant on marshy shores throughout the park area. It often forms nearly pure stands in the shallow water Young flowers found June 6, and flowers throughout July and the first three weeks of August. Fruits are matured late in August.

Cree (Mamawi) creek, No. 1963, lower delta of Athabaska river, No 381 along Quatre Fourches river No 380, east shore of lake Mamawi, No. 1964, 30th base line district, Slave river, No. 384, Murdock Creek district Nos 1968, 1969, near Heart (Raup) lake, No 1966, Fort Smith, No. 383, Pine Lake district, No 1970, Round lake, about 18 miles south of Pine lake, No 1965, sink-hole 16 miles east of Moose lake, No. 1967, Moose (Eight) lake, Nos. 1962, 1971.

E. calva Torr. *See* Rhod. xxxi, 68 (1929)

Collected thus far only on the muddy shore of Slave river, where it was flowering August 12.

Government Hay Camp district, No. 1973.

E. uniglumis (Link) Schultes. *See* Rhod. xxxi, 71 (1929)

Apparently rare in the park area, and collected thus far only from the margin of a sink-hole pond on the upland In fruit July 14.

Round lake, about 18 miles south of Pine lake, No. 1972.

E. acicularis (L.) R. and S.

Common on muddy slough margins and shores throughout the area. Collected in flower July 11 and during the first three weeks of August.

Lower delta of Athabaska river, No 377, Government Hay Camp, Slave river, No 1974, sink-hole 16 miles east of Moose lake, No. 1975, Moose (Eight) lake, No. 1976.

Eriophorum opacum (Björnstr.) Fernald COTTON-GRASS.

Common in upland muskegs, where it flowers in the latter part of June and fruits in July and August.

Pine Lake district, Nos. 1984, 1985, Moose (Eight) Lake district, Nos. 1986, 1987, base of eastern slope of Caribou mountains, Nos. 1988, 1989.

E. spissum Fernald. *E. callitrix* of most Am. auth. *See* Rhod xxvii, 208 (1925)

Apparently only occasional in cold upland muskegs. Fruiting specimens collected during the second week in July.

Pine Lake district, No. 1991, eastern edge of Caribou Mountain plateau, No. 1990.

E. angustifolium Roth.

Apparently rare in Wood Buffalo park, and collected thus far only from a cold bog near Pine lake. In fruit July 9.

Pine Lake district, No. 1983.

Scirpus hudsonianus (Michx.) Fernald. *Eriophorum alpinum* L. ALPINE COTTON-GRASS.

Apparently rare in the park area, and observed thus far only in a muskeg near Pine lake. Specimens collected there have unfortunately been lost.

S. validus Vahl BULRUSH

Abundant throughout the region on marshy lake shores, where it forms dark, bluish green bands which are very conspicuous. Found in flower during the latter part of June and the first half of July. Fruiting in August.

Cree (Mamawi) creek, No. 1980, lower delta of Athabaska river, No. 386, east shore of lake Mamawi, No. 1982, near Heart (Raup) lake, No. 1977, Pine Lake district, No. 1978, Moose (Eight) lake, No. 1979, base of eastern slope of Caribou mountains, No. 1981.

S. paludosus A. Nels.

Salt River region, *Camsell*, No. 92022.

ARACEAE

Calla palustris L. WILD CALLA, or WATER ARUM.

Occasional in the park area, and collected thus far only in the river flood-plain districts, where it flowers in late July.

Cree (Mamawi) creek, No. 1994, Murdock Creek district, No. 1993.

LEMNACEAE

Lemna trisulca L.

Apparently only occasional in the park area. It inhabits the still water of small slough ponds in the lowlands.

Murdock Creek district, No. 1995.

L. minor L. DUCKWEED.

Common in the quiet water of small slough ponds and lake margins throughout the region.

30th base line district, Slave river, No. 394a; Moose (Eight) lake, No. 1996.

JUNCACEAE

Juncus bufonius L. Toad Rush.

Occasional on damp slough margins and in damp rock crevices. Collected in fruit in mid-July and early August.

East shore of lake Mamawi, No. 2009, Round lake, about 18 miles south of Pine lake, No. 2010.

J. Vaseyi Engelm.

Occasional in sandy, open places on the upland. Collected in fruit during the third week in August.

Along trail about 10 miles southwest of Fitzgerald, No. 1997, sink-hole 16 miles east of Moose lake, No. 1998.

J. balticus Willd. Baltic Rush.

Common on muddy and sandy shores in the river lowlands and in parts of the upland districts. The most prominent band of vegetation around the salt flats in the Salt Plain region is made up of this species accompanied by *Calamagrostis inexpansa* var *brevior*. The rush probably makes very little contribution to the forage unless in its early, succulent stages of growth, when its young shoots are greedily eaten by grazing stock. Flower buds appear in mid-June and fruits are matured in August.

Government Hay Camp district, Slave river, No. 2004, near Heart Raup) lake No. 2005, near Mission Farm, No. 2001, Pine Lake district, No. 2003, Peace point, No. 2002.

J. filiformis L. Thread Rush.

Apparently occasional in the park area, and collected thus far only from a sandy sink-hole prairie on the upland. In fruit August 20.

Sink hole 16 miles east of Moose lake, No. 2008.

J. nodosus L.

Common on wet sandy or muddy river banks in the lowland districts, and occasional in similar situations on the uplands. In flower in mid-July, and immature fruit in mid-August.

Lower delta of Athabaska river, No. 408, Government Hay Camp district, Slave river, No. 2007, Fort Smith, *Russell*, No. 28, sink-hole 16 miles east of Moose lake, No. 2006.

J. alpinus Vill.

Occasional on wet, sandy or muddy shores. Collected in flower during J[illegible]

Lower delta of Quatre Fourches river, No. 401, Pine Lake district, No. 2000.

J. alpinus Vill., var rariflorus Hartm. *J. alpinus* var *insignis* Fries. *J. Richardsonianus* Schultes.

Apparently occasional on muddy shores. Immature fruit collected in mid-August.

Government Hay Camp, Slave river, No. 1999.

LILIACEAE

Tofieldia glutinosa (Michx.) Pers. FALSE ASPHODEL.

Apparently rare in Wood Buffalo park, and collected thus far only in a cold, upland muskeg. In flower July 12.

Observation ridge, about 10 miles south of Pine lake, No. 2011.

Zygadenus elegans Pursh *Anticlea elegans* (Pursh) Rydb. POISON CAMAS.

Apparently rare in the park area, and known thus far only from a specimen found "on the top of the limestone cliffs" along Clewi river in flower August 5. Both bulbs and leaves are poisonous.

Clewi river, *Russell*, No. 7

Allium Schoenoprasum L., var. **sibiricum** (L.) Hartm. *A. sibiricum* L. WILD CHIVES, or WILD ONION.

Collected in Wood Buffalo park only on the Salt Plain prairies, where it is very common. In flower during late August.

Near Heart (Raup) lake, No. 2020.

Smilacina stellata (L.) Desf. *Vagnera stellata* (L.) Morong. FALSE SOLOMON'S SEAL.

Common in semi-open prairies throughout the area. It usually inhabits the drier soils in the openings. In flower during mid-June, and maturing its fruit by mid-July.

East shore of lake Mamawi, No. 2016, near Heart (Raup) lake, No. 2012, near Mission Farm, No. 2015, Peace point, Nos. 2013, 2014, base of eastern slope of Caribou mountains, No. 2017.

S. trifolia (L.) Desf. *Vagnera trifolia* (L.) Morong. THREE-LEAVED SOLOMON'S SEAL.

Apparently common in cold, upland muskegs, where it grows on hummocks of *Sphagnum* and other mosses. Collected in flower July 9, and with both flowers and mature fruits August 12.

Pine Lake district, No. 2018, Moose (Eight) Lake district, No. 2019.

Maianthemum canadense Desf., var. **interius** Fernald. *Unifolium canadense* (Desf.) Greene, var. *interius* (Fernald) House. *See* Rhod. xvi, 211 (1914). CANADIAN LILY-OF-THE-VALLEY.

Common in upland woods throughout the region. Found in bud early in June but slow to produce flowers. In Pine Lake district it is not fully out until about July 1. Fruits are matured in late July and August.

Along Quatre Fourches river, No. 441. Fort Smith, No. 436. Pine Lake district, Nos. 2023, 2024, Moose (Eight) Lake district, No. 2025, base of eastern slope of Caribou mountains, No. 2027, eastern slope of Caribou mountains, No. 2026.

IRIDACEAE

Sisyrinchium angustifolium Mill. BLUE-EYED GRASS.

The writer's collections show considerable variation in this species, and may prove upon more intensive study, to contain more than one entity. Common in prairie openings throughout the upland districts. In dry, sandy sink holes it becomes very abundant, and makes up a large part of the herbaceous cover. Collected in flower during late June and early July, and in immature fruit about mid-July. Fruit matures in August.

Near Heart (Raup) lake, No. 2031, Pine Lake district, Nos. 2033, 2034, 2035, Peace point, No. 2032, sink-hole 16 miles east of Moose lake, No. 2029, Moose (Eight) Lake district, No. 2030.

ORCHIDACEAE

Cypripedium passerinum Richards. *See* Trans Roy Soc, Canada, ser iii, sec v, pp 163-172 (1929), for general treatment of this species. LADY'S SLIPPER.

Occasional in rather dry woodlands. Collected thus far within the park only on the shore of Pine Lake, where it grows in large patches. It was in the height of its flowering period June 25, and well past it July 3.

Pine Lake district, No 2044, lower Slave river, No. 469.

Orchis rotundifolia Pursh. ORCHIS.

Common in timbered muskegs throughout the upland districts. Observed in flower between June 16 and July 11. Immature fruits collected August 12.

Fort Smith, No. 475, Pine Lake district, Nos. 2049, 2050, Moose (Eight) Lake district, No. 2048, base of eastern slope of Caribou mountains, No 2051

Habenaria viridis (L.) R Br var **bracteata** (Willd) Gray *Coeloglossum bracteatum* (Willd.) Parl

Occasional in dry upland woods and thickets. Collected in flower between June 20 and July 19. Immature fruits observed July 25.

Pine Lake district, Nos 2062, 2063, Peace point, Nos. 2064, 2065.

H. hyperborea (L.) R Br *Limnorchis hyperborea* (L.) Rydb *L. viridiflora* (Cham.) Rydb. BOG ORCHID, or REIN ORCHID

Rather common in muskegs throughout. Observed in flower during the latter part of June and until July 25.

Pine Lake district Nos 2059, 2061, Observation ridge, about 10 miles south of Pine Lake, No 2060, lower Slave river, No. 446.

H. obtusata (Pursh) Richards. *Lysiella obtusata* (Pursh) Rydb.

A common species in rich woods and timbered muskegs, and by far the commonest orchid in the region. In flower from about mid-June through most of July. Immature fruit collected August 11.

Fort Smith No 451, Pine Lake district, Nos 2054, 2055, 2056, Moose (Eight) Lake district, No 2053, base of eastern slope of Caribou mountains, Nos 2052, 2058 eastern edge of Caribou Mountain plateau, No. 2057, lower Slave river, No. 449.

Spiranthes Romanzoffiana Cham *Ibidium strictum* (Rydb) House. LADIES' TRESSES.

Occasional in upland timbered muskegs throughout the area. Flower buds collected in mid-July and flowers in early August. Immature fruit collected August 17.

Government Hay Camp district, Slave river No 2073, near upper Smith rapids, No 465, Observation ridge about 10 miles south of Pine lake No 2074 Moose (Eight) Lake district, No 2072, Little Buffalo river, *Russell*, No 90.

Goodyera repens (L.) R Br var **ophioides** Fernald. *Epipactis repens* (L.) Crantz var *ophioides* (Fernald) A. A. Eaton *Peramium ophioides* (Fernald) Rydb. RATTLESNAKE PLANTAIN.

Occasional in rich spruce woods, where it grows in the thick moss mat. Flower buds collected during the first and second weeks of July, and flowers in late July and early August.

Pine Lake district, No. 2069, Moose (Eight) Lake district, Nos. 2066, 2067, 2068, Indian graveyard, Peace river, No. 2071, eastern slope of Caribou mountains, No. 2070.

Listera borealis Morong. *Ophrys borealis* (Morong) Rydb. TWAYBLADE.

Occasional in timbered muskegs, where it has been collected in flower between June 16 and July 8.

Fort Smith, No. 460, Pine Lake district, Nos. 2041, 2042, along trail about 5 miles north of Indian graveyard, Peace river, No. 2043.

Calypso bulbosa (L.) Oakes. *C. borealis* Salisb. *Cytherea bulbosa* (L.) House. CALYPSO, or VENUS' SLIPPER.

Occasional in rich spruce forests on the upland, and common in a few localities. It flowers early in the season, from the first to the middle of June, but late flowers have been found June 26. The plants are in fruit about the middle of July.

Salt mountain, No. 2046. Pine Lake district, No. 2045, eastern edge of Caribou Mountain plateau, No. 2047.

Corallorrhiza trifida Chat. *C. Corallorrhiza* (L.) Karst. CORAL-ROOT.

Occasional in rich woods and timbered muskegs throughout the area. It is very often found growing singly, with no others of its kind anywhere near. Collected in flower from the middle to the last of June, and in fruit during late July and August.

East shore of Lake Mamawi, No. 2037, Salt mountain, No. 2040, Pine Lake district, Nos. 2038, 2039, base of eastern slope of Caribou mountains, No. 2036.

SALICACEAE

Populus tremuloides Michx. WHITE POPLAR, TREMBLING ASPEN.

Abundant in dry, upland woods throughout Wood Buffalo park. Over vast areas that have been burned in times past the aspen forms nearly pure stands of large, straight trees, often reaching 2 feet in diameter. When the growth is young it is close and thicket-like, but in older timber there is an open, park like aspect, in which young spruce and some balsam poplar appear. In the young forest the ground cover is exceedingly scanty, and there is only a thin mould of dead leaves, but in older timber there is an increasing growth of mat-forming mosses and a relatively abundant herbaceous flora consisting of grasses and many other plants suitable for forage. The aspen is an important source of firewood over much of the park area. Fruiting catkins were observed June 13 at Fort Smith, and at Pine lake, on June 21, the ripened catkins had nearly all fallen to the ground.

Along Quatre Fourches river, No 486, 30th base line, Slave river, No 482 Fort Smith No 480, Pine Lake district, Nos 2076, 2079, Peace point No 2077 Moose (Eight) Lake district No 2078, base of eastern slope of Caribou mountains, No 2075, Little Buffalo river *Russell*, No. 23.

P. tacamahacca Mill *P balsamifera* DuRoi not L *See* Jour Arn Arb x, 66 (1929) BALSAM or BLACK POPLAR.

Abundant in the flood plain forests where it forms nearly pure stands as the first tree in the flood plain and delta successions In older lowland timber it is mixed with spruce and later is entirely replaced by the latter Throughout the upland districts it is associated with aspen *P tremuloides* in burned-over country where it usually appears in the transition timber between aspen and spruce Trees 2 feet in diameter at the base are not uncommon Along the main rivers the black poplar has been a source of firewood for trappers and for the wood-burning steamboats for many years. Fruiting catkins were collected between June 7 and June 24.

Along Quatre Fourches river Nos 493, 494 30th base line, Slave river No 495 Fort Smith No 497 Pine Lake district No 2081, Moose (Eight) Lake district, No 2080, base of eastern slope of Caribou mountains, No. 2082.

Salix lasiandra Benth *See* Cont Am Arboret vi 142-3 (1924) RED WILLOW

Common in the lowland flood-plain and delta districts, where it grows at the margins of sloughs and on damp sand and mud bar deposits Thus far it has been found occupying only the transition ground between the colonizing willows of bars and sloughs and the more mesophytic species on higher areas In the deltas it shares this role with *S petiolaris* Flowers collected June 14 and mature fruit August 10

East shore of lake Mamawi No 2084, 30th base line district, Slave river, No. 560.

S. interior Rowlee var **pedicellata** (Anders) Bell *S lucorifolia* Rydb *See* Can Field-Nat xl 178 1926) SAND-BAR WILLOW

Abundant on river sand-bars throughout the region Pure stands of it in such situations are the first of the shrubby growths to appear on recently deposited soils and make a conspicuous pale-green bank of filmy foliage on low islands and local flood-plain deposits In the lower deltas of the large streams it is largely replaced by slough margin willows like *S planifolia* In flower during the first two weeks of June and in fruit during July Late fruiting catkins cling to the branches and may be collected as late as August 20

Lower delta of Athabaska river No 566, east shore of lake Mamawi, No 2086 along Quatre Fourches river, Nos 564 565, 30th base line district Slave river, No 563 Peace point, No 2087

S. brachycarpa Nutt var **antimima** (Schneider) Rehd *See* Rhod xxxiii, 261-4 (1931)

Collected in this region only on the Salt Plains and in Caribou mountains. In the former region it is an important constituent of the thickets that margin the prairies and in the latter it inhabits muskeg thick-

ets. Found in fruit on the Salt Plains August 19, and in the mountains July 11.

Near Heart (Raup) lake, No. 2139, eastern edge of Caribou Mountain plateau, No. 2140.

S. MacCalliana Rowlee.

Common in thickets on the Salt Plain, and occasional on marshy lake margins elsewhere on the upland. Immature fruit collected June 15, and mature fruit during the middle part of August.

Near Heart (Raup) lake, No. 2165, near Mission Farm, No. 2166, Moose (Eight) lake, No. 2164.

S. glauca L. *See Rhod. xxxvi, 241-4 (1931)*

Common throughout the upland districts, where it inhabits muskeg thickets and open muskeg timber, or the borders of rich woods. It varies widely in leaf-form and pubescence, and in the form and size of the shrub, but is not sufficiently variable to make from it more than a single specific entity. Flowering specimens of both sexes have been collected June 20, when they appeared to be at the height of their season. Male flowers persist through the first half of July. Fruits begin to mature in late June and early July, and may be collected in good condition during the third week in August.

Government Hay Camp district, Slave river, No. 2129, near Heart (Raup) lake, No. 2128. Pine Lake district, Nos. 2132, 2133, 2136, 2137, 2138, Moose (Eight) Lake district, Nos. 2130, 2131, 2134, 2135, base of eastern slope of Caribou mountains, No. 2126, eastern edge of Caribou Mountain plateau, No. 2127.

S. lutea Nutt. YELLOW WILLOW.

Abundant on the upper parts of local river flood-plain deposits, where it makes a transition stage between the sand-bar willows and the encroaching poplar timber. Its foliage has a bluish green cast which sets it off as a distinct band of vegetation on these areas. Flowers collected during the first week in June, and fruit during the latter half of June and early July.

Along Quatre Fourches river, Nos. 555, 558, 30th base line, Slave river, No. 554, Peace point, No. 2102, lower Slave river, No. 557.

S. Farrae Bail. *See Cont. U.S. Nat. Herb. xxii, 321 (1920), Jour. Arn. Arboret. iii, 72 (1921), Univ. Calif. Pub. in Bot. xvii, 405-6 (1934)*

Apparently rare in the region, and collected thus far only from a muskeg thicket in Caribou mountains. It had immature fruit July 11.

Eastern edge of Caribou Mountain plateau, No. 2085.

S. myrtillifolia Anders.

An abundant willow in muskeg thickets and muskeg timber throughout the region. In such situations it is either a low bush or a dwarfed trailing shrub growing in the moss mat, but in semi-open prairies where it is occasionally found, it sometimes grows to a height of 10 feet. Leaf characters are also extremely variable. Flowers appear during the second and third weeks of June, and fruits during the latter part of June and the first

half of July Old fruiting catkins may be found clinging to the branches in August

30th base line district, Slave river, No 516, Pine Lake district, Nos. 2157 2158 2159, 2161, 2162 Moose (Eight) Lake district, Nos. 2156, 2160; base of eastern slope of Caribou mountains, Nos. 2151, 2153, 2154, 2155; eastern edge of Caribou Mountain plateau, No 2152

S. pseudomonticola Bal See Cont U S Nat Herb. xxv 331 (1921), and Jour Arn. Arboret iii, 73 (1921)

Occasional in the fringe of timber along upland lake shores. Known thus far in Wood Buffalo park from only two localities and from rather poor specimens The species needs further study Old fruits found during the first half of July

Pine lake Nos 2104 2105, Moose (Eight) lake, No. 2106.

S. pyrifolia Anders *S. balsamifera* Barr BALSAM WILLOW

Apparently rare in Wood Buffalo park, and collected thus far only on the muskeg shore of an upland lake Fruits beginning to mature June 25.

Base of eastern slope of Caribou mountains, No. 2083.

S. candida Fluegge SAGE WILLOW

Common in upland muskeg thickets where it has been collected with immature fruits in late June, and with mature fruits during July and the first half of August

Near Heart (Raup) lake. No. 2089, Pine Lake district, Nos. 2090, 2091 2092 Moose (Eight) Lake district, No 2088, Lobstick creek, *Russell*, No. 11

S. Bebbiana Sarg. *S. rostrata* Richards GRAY WILLOW

Probably the most abundant willow in the region, commonly growing to a height of 15 or 20 feet, and having a stout trunk often 4 or 5 inches in diameter An individual 1½ inches in diameter at the base and 9 feet high was twenty-five years old It is the most important constituent of the small tree and shrub layer in nearly all the woodlands, becoming most abundant in young river bottom timber and in the upland aspen woods. In delta plains it makes nearly pure stands over vast areas between the meadow margins and the slowly encroaching poplar timber In the upland semi-open country it borders many of the prairies Dead, semi-dry branches and trunks found in older woods supply a rather inferior though commonly used firewood Catkins in an immature fruiting condition have been collected from June 6 to 13 During the latter part of June and early July the air is full of the floating seeds of this species, and by the first week in July the catkins have begun to fall off

East shore of lake Mamawi, Nos. 2107, 2108, along Quatre Fourches river Nos 540 542 30th base line district, Slave river, No. 539, Government Hay Camp district Slave river, No 2111, Fort Smith Nos. 538, 2118 Pine Lake district, Nos 2115, 2119. 2121, Round lake, about 18 miles south of Pine lake No. 2114 Peace point, Nos. 2112, 2113, Moose (Eight) Lake district, Nos 2116 2117, 2122, base of eastern slope of Caribou mountains, Nos. 2109, 2110.

S. pedicellaris Pursh var **tenuescens** Fernald. *See* Rhod. xi, 162 (1909)

Apparently rare or only occasional in the park area, and collected thus far only in an upland muskeg thicket. In fruit July 9.

Pine Lake district, No. 2103.

S. athabascensis Raup. *See* Rhod. xxxii, 111 (1930).

Collected thus far only from its type locality, a muskeg thicket about 1 mile north of the Moose (Eight) Lake ranger station. In fruit August 17.

Moose (Eight) Lake district, No. 8129.

S. petiolaris Smith

Common at slough margins and occasional at the edges of upland semi-open prairies. In fruit in mid-June.

East shore of lake Mamawi, Nos. 2123, 2124, 30th base line district, Slave river, Nos. 567, 569. Fort Smith, No. 568, Pine Lake district, No. 2125.

S. planifolia Pursh. *S. chlorophylla* Anders. *See* Jour. Arn. Arboret. 1: 75 (1919)

Abundant at slough and prairie margins, and on local river flood-plains throughout the region. It is the pioneer colonizing willow at the margin of nearly every wet meadow, and small bushes of it are usually found well out from the main mass of shrubbery that lines such places. Fruiting season apparently at its height from the middle to the last of June, but old fruiting catkins are often found clinging to the branches in August.

East shore of lake Mamawi, Nos. 2144, 2145, 2146, along Quatre Fourches river, No. 515, 30th base line district. Slave river, No. 513, Murdock Creek district, No. 2148. Pine Lake district, Nos. 2149, 2150, Moose (Eight) lake, No. 2147, base of eastern slope of Caribou mountains, No. 2142, eastern edge of Caribou Mountain plateau, No. 2143.

S. Nelsonii Ball.

This species may prove, upon further study, to be only a variety or form of *S. planifolia* Pursh. Schneider, in monographing North American willows, expressed this opinion very clearly (62). Occasional at slough margins. In fruit during the latter half of June.

Fort Smith, No. 514, Round lake, about 18 miles south of Pine lake, No. 2141.

S. arbusculoides Anders.

A common willow of muskeg and slough margins throughout the region. It also appears in the fringe of the timber that grows on local river flood-plain deposits. Although often a low bush, it sometimes grows to a height of 10 feet. Fruiting catkins collected from June 12 to the first week in July. A few old catkins often cling to the branches, and have been so collected in mid August.

30th base line district, Slave river, No. 550. Government Hay Camp district, Slave river, No. 2097. Fort Smith, No. 2096, Pine Lake district, Nos. 2099, 2100, Peace point, No. 2098, Moose (Eight) Lake district, Nos. 2095, 2101, base of eastern slope of Caribou mountains, No. 2094, eastern edge of Caribou Mountain plateau, No. 2093.

MYRICACEAE

Myrica Gale L. SWEET GALE.

Apparently rare or occasional in the park area, and thus far known only from "swamplands" in the northern district.

Clew river, *Russell*, No. 51

BETULACEAE

Betula papyrifera Marsh. var. **neoalaskana** (Sarg.) Raup. See Contr. Arn. Arboret. vi. 152, 1934. WHITE BIRCH.

Common throughout the timbered areas, but abundant in only a few localities. Trees usually 6 to 10 inches in diameter but occasionally 12 to 15 inches. One of the most useful trees the region affords. The bark has been used for generations by the Indians for the manufacture of canoes and many kinds of utensils. It is light, easily laced and sewed, and easily made waterproof. The wood is light and easily worked, and is the nearest approach to hardwood available. Found in flower during mid-June and in fruit during July and August.

Along Quatre Fourches river, Nos. 601, 605, Government Hay Camp district, Slave river, No. 2181, Pine Lake district, No. 2182, Moose (Eight) Lake district, Nos. 2179, 2180, base of eastern slope of Caribou mountains, No. 2183, lower Slave river, No. 604.

B. microphylla Bunge. *B. fontinalis* Sarg.

Occasional in the park area, and collected thus far only on the shore of Pine lake and in a muskeg at the base of Caribou mountains. In fruit in the latter part of June and the first part of July.

Pine Lake district, No. 2177, base of eastern slope of Caribou mountains, No. 2178.

B. pumila L., var. **glandulifera** Regel. SWAMP BIRCH.

Apparently rare or only occasional in the park area, and collected thus far only in a single upland muskeg. Fruiting in mid-August.

Moose (Eight) Lake district, No. 2176.

B. glandulosa Michx. DWARF BIRCH.

Abundant in muskeg thickets throughout the upland, and in thickets between prairies on the Salt Plain. It is one of the most important elements in the muskeg shrub cover and precedes the black spruce in the development of muskeg timber.

Near Heart (Raup) lake, No. 2173, Fort Smith, No. 579, Pine Lake district, No. 2171, base of eastern slope of Caribou mountains, No. 2174, eastern edge of Caribou Mountain plateau, No. 2175.

Alnus crispa (Ait.) Pursh. *A. alnobetula* Am. auth. BOG, or WOODLAND ALDER.

Abundant in upland woods chiefly of the coniferous type. It is found both on dry jackpine ridges and in deep, mossy spruce woods. In both of these it makes up a large proportion of the scant undergrowth. The richest stands the writer has seen are on the upper slopes of Caribou mountains. Immature fruits are found in late June and early July, and mature ones in August. The plants appear to be in full flower during the second week in June.

Along Quatre Fourches river, No. 622, Government Hay Camp district, Slave river, No 2186, Pine Lake district, No 2185, eastern slope of Caribou mountains, No. 2184.

A. incana (L.) Moench. SPECKLED ALDER.

Abundant on lake shores and river banks throughout the region. Flowering period appears to be in the latter part of June and the first part of July. Fruiting cones are found in August.

Along Quatre Fourches river, Nos 608, 612, 30th base line district, Slave river, No. 619, Government Hay Camp, Slave river, No 2189, Pine Lake district, No 2190, Moose (Eight) Lake district, Nos. 2187, 2188, base of eastern slope of Caribou mountains, No 2191.

URTICACEAE

Urtica gracilis Ait. *See* Rhod. xxvii., 191 (1926) NETTLE.

Common in damp meadows and prairies and cabin clearings throughout the area. Flower buds collected June 16, flowers during late June and early July, and fruit in late July and August.

30th base line district, Slave river, No 641 Government Hay Camp, Slave river Nos 2205, 2206, Round lake, about 18 miles south of Pine Lake, No 2203, Moose (Eight) Lake district, No 2204, base of eastern slope of Caribou mountains, No. 2202, Clewi river, *Russell*, No. 13.

SANTALACEAE

Comandra pallida A.DC. BASTARD TOAD-FLAX.

Occasional on dry prairies and sandy hills. Collected in flower June 26, and with immature fruit during the third week in July.

Pine Lake district, No. 2201, Peace point, Nos. 2200, 2199.

Geocaulon lividum (Richards.) Fernald. *Comandra livida* Richards. *See* Rhod. xxx, 21 (1928) NORTHERN COMANDRA.

Common in woodlands throughout the region. Found in flower during the last three weeks of June and in early July. In fruit during July and August.

Along Quatre Fourches river, No. 644 Government Hay Camp district, Slave river, No. 2196, Fort Smith, No 648 Pine Lake district, Nos 2197, 2198, Moose (Eight) Lake district, Nos. 2194, 2195, base of eastern slope of Caribou mountains, No. 2193, eastern edge of Caribou Mountain plateau, No. 2192.

POLYGONACEAE

Rumex occidentalis S. Wats. WESTERN DOCK.

Common in wet sloughs throughout the area. Collected in flower during the latter half of July and with mature fruit about mid-August.

Murdock Creek district, No 2214 Government Hay Camp district, Slave river, No 2216, near Heart (Raup) lake. No 2213 Peace point, No 2215, sink-hole 16 miles east of Moose lake, No. 2212. Moose (Eight) Lake district, Nos 2208, 2209, 2210 2211, base of eastern slope of Caribou mountains, No. 2207.

R. mexicanus Meisn WILLOW-LEAVED DOCK.

Common in damp meadows and sloughs throughout the area Collected in flower from the middle to the last of July, and in fruit during the first half of August

East shore of lake Mamawi, Nos. 2225, 2227, lower delta of Athabaska river No 670 near Round lake, about 18 miles south of Pine lake, No 2224, Peace point No 2228, base of eastern slope of Caribou mountains. No 2226.

R. maritimus L var **fueginus** (Phil.) Dusen. See Rhod. xvii, 73 (1915) GOLDEN DOCK

Common in damp meadows and slough margins In flower in mid-July and in fruit during the latter part of August.

Lower delta of Athabaska river, No 673 Murdock Creek district, No. 2221 Government Hay Camp district, Slave river, Nos. 2220, 2222, near Heart (Raup) lake, No. 2219, sink hole 16 miles east of Moose (Eight) lake No 2218, Moose (Eight) Lake district, Nos 2217, 2223, Little Buffalo river, *Russell*, No 29

Polygonum prolificum (Small) B. L. Robinson

Apparently rare or occasional, and confined to the Salt Plain region. Bulblets maturing when the specimens were collected August 19

Near Heart (Raup) lake, No. 2229.

P. aviculare L KNOTWEED

Common in damp sloughs and rock crevices, and in cabin clearings throughout the lowlands Occasional in the upland districts. It may be adventive as suggested by its nearly complete limitation to the routes of travel In flower during the last week in June, and in various stages of flower and fruit through July and August.

Reed portage, upper Embarras river, No. 2234 east shore of lake Mamawi No 2233 Government Hay Camp district, Slave river, No. 2232, Fort Smith No. 658, sink-hole 16 miles east of Moose lake, No. 2235.

P. viviparum L. *Bistorta vivipara* (L.) S F Gray BISTORT

Apparently occasional in the park area, and collected thus far only in small meadow openings and muskegs. Collected with flowers and immature bulblets during the latter part of June and the first of July

Pine Lake district, Nos. 2230, 2231

P. lapathifolium L. var **salicifolium** Sibth *P. tomentosum* Schrank, var **incanum** (Schmidt Gürke See Rhod. xxiii, 259 (1921)

Occasional on damp slough margins Collected in flower in mid-July and early August, and with immature fruit August 20.

East shore of lake Mamawi No 2254, Round lake, about 18 miles south of Pine lake, No. 2253, sink-hole 16 miles east of Moose lake, No. 2252.

P. natans A. Eat., and forma **Hartwrightii** (Gray) Stanford. *See* Rhod. xxvii, 156 (1925) WATER SMARTWEED.

Common on lake and slough margins and in sluggish streams throughout the area. The creeping mud plant with hairy leaves and stem sometimes known as *P. Hartwrightii*, is clearly no more than a form of the aquatic one. If it should have even that much designation. Flowers appear in the latter part of July and in the first half of August. Fruits begin to mature about the middle of August.

Cree (Mamawi) creek, No. 2248, east shore of lake Mamawi, Nos. 2249, 2250. Murdock Creek district, Nos. 2241, 2242. Government Hay Camp district, Slave river, Nos. 2245, 2251, Fort Smith, No. 663, Pine Lake district, No. 2240, Round lake, about 18 miles south of Pine lake, No. 2244. Moose (Eight) Lake district, Nos. 2246, 2247, sink-hole 16 miles east of Moose lake, No. 2243.

P. CONVOLVULUS L. *Bilderdykia Convolvulus* (L.) Dunn. BINDWEED.

Occasional in the settled districts, where it occupies dry cleared ground and is probably adventive. Found in the interior only at a much-frequented camp site. In early flower July 12, and with mature fruit in the early part of August.

East shore of lake Mamawi, Nos. 2237, 2239, Government Hay Camp, Slave river, No. 2236, Observation ridge, about 10 miles south of Pine lake, No. 2238.

CHENOPODIACEAE

Chenopodium capitatum (L.) Asch. *Blitum capitatum* L. STRAWBERRY BLIGHT.

Common in settlements, cabin clearings, buffalo wallows, burned areas, and on the banks of streams where the soil is disturbed by under-cutting. In flower during the latter part of June, and producing its fleshy red spikes during July and August.

Government Hay Camp, Slave river, No. 2266, Fort Smith (Coll. *Mrs. Conibear*) No. 676, Pine Lake district, No. 2265, base of eastern slope of Caribou mountains, Nos. 2267, 2268, lower Slave river, No. 675, Little Buffalo river, Russell, No. 35.

C. rubrum L. RED GOOSEFOOT.

Apparently confined to the Salt Plains, where it is occasional. Collected with immature fruit August 19.

Near Heart (Raup) lake, No. 2264.

C. album L. LAMB'S QUARTERS, PIGWEED.

Abundant as a weed in settlements and cabin clearings throughout the region. In the interior upland it occasionally appears in damp, recently burned areas, and in damp sink-hole meadows. A common and excellent source of "greens" when in its immature stages of growth. Plants 4 to 6 inches high are available in the latter part of June or early July, and in lesser numbers later in the summer. Flowers usually occur during July, and fruits about mid-August.

East shore of lake Mamawi, Nos. 2269, 2270, Government Hay Camp, Slave river, Nos. 2275, 2276. Pine Lake district, No. 2272, Round lake, about 18 miles south of Pine lake, No. 2274, base of eastern slope of Caribou mountains, No. 2271.

C. lanceolatum Muhl. *C. album* L. var. *viride* (L.) Moq. GOOSEFOOT.

Occasional in Wood Buffalo park, and collected only in dry, upland prairie openings. In flower July 17 and fruit August 20.

Peace point, No. 2262, sink-hole 16 miles east of Moose lake, No. 2263.

C. leptophyllum Nutt. NARROW-LEAVED GOOSEFOOT.

Apparently only occasional, and confined to dry, semi-open prairies. Fruits immature August 9, and mature August 20.

East shore of lake Mamawi, No. 2278, sink-hole 16 miles east of Moose lake, No. 2277.

Atriplex patula L. *Sec.* Rhod. xxxiv, 252, 1927) ORACH.

Common in saline areas on the Salt Plains and along streams draining from them. This species and its variety *hastata* make up a variable group of plants that need further study. One form (No. 2256) has excessively enlarged bracts and large bract-like leaves in the inflorescence. Found with flowers during early August, and with immature fruit August 20.

Government Hay Camp district, Slave river, No. 2258, near Heart (Raup) lake, Nos. 2256, 2257.

A. patula L., var. **hastata** (L.) Gray.

Common in same places in the Salt Plains districts. In flower August 19.

Near Heart (Raup) lake, No. 2255.

Salicornia europaea L. GLASSWORT, SAMPHIRE.

The writer has been unable to separate his material of this species from the European plant, although this is commonly done in America. Abundant at the margins of saline flats and brine springs in the Salt Plains. In late August it makes a conspicuous red band around the light-coloured, alkaline, barren areas. In fruit August 19.

Near Heart (Raup) lake, No. 2259, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 72(1).

Suaeda depressa (Pursh) S. Wats. *Dondia depressa* (Pursh) Britton. SEA BLIGHT.

Occasional or possibly common at the margins of saline flats on the Salt Plains. Found in fruit August 20.

Near Heart (Raup) lake, Nos. 2260, 2261.

CARYOPHYLLACEAE

Stellaria longifolia Muhl. *Alsine longifolia* (Muhl.) Britton. CHICKWEED.

Probably the most abundant chickweed in the region. It is to be seen in nearly every wet meadow, damp prairie or muskeg, and is extremely variable in the form of its leaves and the size of its flowers. Flower buds

appear early in June and flowering continues through July Fruits are matured in August

East shore of lake Mamawi, No 2303 along Quatre Fourches river, No. 722 30th base line district, Slave river, Nos 720. 721 Government Hay Camp district, Slave river No. 2309, Fort Smith, Nos. 717 723, Pine Lake district, Nos 2311 2312, 2313, Moose (Eight) Lake district Nos. 2307 2308. 2314, Indian graveyard, Peace river, No 2304, base of eastern slope of Caribou mountains Nos 2300, 2301, 2305, 2306, eastern edge of Caribou Mountain plateau, No. 2302.

S. longipes Goldie, var **laeta** (Richards.) S Wats *Alsine laeta* (Richards.) Rydb.

Common in dry prairies and clearings, and in damp meadows, but occasionally found in sloughs and muskegs, largely limited to the upland districts Extremely variable in leaf-form, growth-habit, and degree of glaucousness Flowers from the middle of June to the latter part of July Fruits mature in late July and the first half of August

East shore of lake Mamawi, Nos 2336, 2337, Fort Smith, No 717, Pine Lake district, Nos 2310, 2328, 2330, 2331, 2332, 2334 Peace point, No 2333 sink-hole 16 miles east of Moose lake, No 2335, base of eastern slope of Caribou mountains, Nos. 2338, 2339, 2340, 2341, lower Slave river, No 710.

S. borealis Bigelow *Alsine borealis* (Bigelow) Britton. *See* Rhod. xvi, 144 (1914)

Common in wet meadows and sloughs throughout the area. Found in flower during the latter part of June, and in various stages of flower and fruit through July and most of August

Murdock Creek district, Nos. 2315, 2316 Fort Smith, No 728 Pine Lake district, Nos 2319, 2321 2322, Round lake, about 18 miles south of Pine lake, No 2320 sink-hole 16 miles east of Moose lake, No. 2317, Moose (Eight) Lake district, Nos 2318, 2323.

S. crassifolia Ehrh. *Alsine crassifolia* (Ehrh.) Britton.

Occasional in upland muskeg sloughs Collected in flower early in July and in fruit during August

Pine Lake district, No. 2324, sink-hole 16 miles east of Moose lake, No 2325, Moose (Eight) Lake district, Nos 2326, 2327.

Cerastium Beeringianum Cham. and Schlecht *See* Rhod. xxii. 169 (1920) Mouse-ear Chickweed

Apparently rare or occasional in the area, and collected thus far only in a damp slough near Fort Smith In flower June 23.

Fort Smith, No. 694

C. nutans Raf

Occasional on damp sandy lake and slough margins, and in damp rock crevices. Also found in sandy buffalo wallows Early flowers collected June 22, and fruit July 14.

East shore of lake Mamawi, No. 2296, Pine Lake district Nos 2297, 2298, Round lake, about 18 miles south of Pine lake, No. 2299

C. arvense L.

Common in rather dry, upland prairie openings. Found in flower from mid-June to the latter part of July, and with a few late flowers August 20.

Near Heart (Raup) lake No 2290 near Mission Farm, No. 2293, Pine Lake district. Nos 2291, 2294, base of eastern slope of Caribou mountains. No. 2295.

Arenaria lateriflora L. *Moehringia lateriflora* (L.) Fenzl. *See* Rhod xix, 269 (1917).

Common in shady woods throughout the area Collected in flower between the middle of June and the middle of July Fruit probably matures in late July or early August, though none is found in the writer's collections

East shore of lake Mamawi, No 2286, 30th base line district, Slave river Nos 684 685 Fort Smith. No 683 Pine Lake district, Nos 2280. 2281 Moose (Eight) Lake district, No 2279 base of eastern slope of Caribou mountains, Nos 2283, 2284, eastern edge of Caribou Mountain plateau No. 2285

A. dawsonensis Britton. *A. litorea* Fernald. *See* Mem. Am Acad. xv 279 (1925). SANDWORT

Occasional in upland meadow openings and muskegs, and in rock crevices. Collected in flower June 20. and in fruit during August.

East shore of lake Mamawi, No. 2288, Pine Lake district, No. 2287, sink hole 16 miles east of Moose lake, No. 2289.

Spergularia salina J and C Presl. *S. marina* Griseb in Gray's Man., 7th ed *Tissa salina* (Presl) Greene. *See* Rhod xx. 157 (1910) SAND SPURRY

Common at the margins of saline flats and brine springs on the Salt Plains Collected in fruit August 19-20

Near Heart (Raup) lake, Nos. 2342, 2343, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 72(2)

Lychnis Drummondii (Hook.) S. Wats. *Wahlbergella Drummondii* (Hook.) Rydb. CAMPION

Apparently rare in Wood Buffalo park, and collected thus far only in the driest upland prairies In fruit July 17

Peace point, No. 2344.

NYMPHAEACEAE

Nymphozanthus variegatus (Engelm.) Fernald. *Nymphaea variegata* (Engelm.) G S Miller *See* Rhod. xxi, 187 (1919) COW LILY, YELLOW WATER-LILY

Abundant in shallow lakes, ponds, and sluggish streams. The most extensive growth thus far observed by the writer is at Moose (Eight) lake, where it forms a dense zone 100 feet or more wide along the marshy shores. Found in flower in the latter part of June and through July Fruits mature during the latter part of August or later

Cree (Mamawi) creek No 2350 Murdock Creek district, No. 2347, Pine Lake district. No. 2346, Moose (Eight) lake, Nos 2348, 2349, 2351

CERATOPHYLLACEAE

Ceratophyllum demersum L. HORNWORT

Apparently occasional in the park area, and collected thus far only in a lowland slough pond. The genus is badly in need of study in America and may contain more than one species in the north. The rarity with which fertile plants are collected makes this very difficult. The writer's specimens were found with mature fruit July 28.

Murdock Creek district, No. 2345.

RANUNCULACEAE

Actaea rubra (Ait.) Willd. BANEBERRY

Common in poplar or poplar-spruce woodlands throughout the area. There is a great variety in the colour of the berries, some of them maturing white and others bright red. Flowers appear about the third week in June, and fruit during the latter half of July and August. The rootstock has a strongly purgative action, and the berries are known to be somewhat poisonous.

East shore of lake Mamawi, No. 2390, 30th base line, Slave river, No. 755. Government Hay Camp district, Slave river, Nos. 2394, 2398, 2399, near upper Smith rapids, No. 757, Fort Smith, No. 754, Pine Lake district, Nos. 2400, 2401, Moose (Eight) Lake district, Nos. 2395, 2396, 2397, Indian graveyard, Peace river, No. 2389, base of eastern slope of Caribou mountains, Nos. 2391, 2392, 2393.

Aquilegia brevistyla Hook. COLUMBINE.

Occasional in poplar woods, chiefly in the upland districts. Flowers observed from June 18 to July 11, when the fruiting follicles are well formed. Where it inhabits more damp areas the flowering period is a little longer. Mature fruit collected August 1.

Fort Smith, No. 760, Pine Lake district, No. 2429, Indian graveyard, Peace river, No. 2428, specimen of unknown locality, No. 2427.

Delphinium scopulorum Gray var. **glaucum** Gray. LARKSPUR.

Common in upland clearings and open poplar woods, and abundant in some of the semi-open prairie districts. In the prairies at the base of Caribou mountains it grows to such size and numbers as to give a purple colour to large areas during its flowering season. A record plant measured 9 feet 3 inches in height, with a small part of the inflorescence still to be unfolded. Rare individuals have a tendency toward albinism. Young shoots have been observed as early as June 19, and flower buds from June 28 to July 7. The earliest flowers found thus far were on July 5, and flowering continues through most of July. Immature fruits are found in the last week of July, and mature ones in August. Known to be poisonous to cattle, producing stiffness, convulsions, and death.

Government Hay Camp district, Slave river, Nos. 2355, 2356, Pine Lake district, Nos. 2357, 2358, base of eastern slope of Caribou mountains, Nos. 2352, 2353, lower Slave river, *Russell*, No. 75.

Anemone parviflora Michx. NORTHERN ANEMONE.

Apparently rare or only occasional and collected thus far only in up and muskeg timber, where it is in flower July 11

Pine Lake district, No. 2421.

A. multifida Poir., var **hudsoniana** DC. *See Rhod.* xix, 141 (1917) HUDSONIAN ANEMONE

Common on upland dry ridges and prairies, and in rock crevices. Collected in flower from June 15 through the first week in July. Late flowers and immature fruit are found through the third week in July, and fruits in August

Government Hay Camp district, Slave river, No. 2417, Fort Smith, No. 774, near Mission Farm, No. 2415, Pine Lake district, Nos. 2412, 2414, 2416, 2418, Peace point, Nos. 2419, 2420, Moose (Eight) Lake district, No. 2413

A. cylindrica Gray

Apparently occasional in Wood Buffalo park and collected thus far only on the Peace Point prairie, where it is common. Late flowers and immature fruit collected July 17 to 21, and mature fruits observed August 2

Peace point, Nos. 2409, 2410, 2411

A. canadensis L. CANADIAN ANEMONE

Common at slough margins and in prairies. New rosettes collected June 12, and flowers from July 14 to the first week in August. Fruits matured during the middle part of August.

East shore of lake Mamawi, Nos. 2424, 2426, 30th base line district, Slave river, No. 769, Round lake, about 18 miles south of Pine lake, No. 2423, Peace point, No. 2422, Indian graveyard, Peace river, No. 2425.

Pulsatilla ludoviciana (Nutt.) Heller. *Anemone patens* L., var. *Wolfgangiana* (Bess.) Koch. WILD CROCUS, PULSATILLA.

Common on dry, sandy or rocky ridges and in dry prairies throughout the region. It is one of the earliest flowers of the spring. Late flowers have been found June 13, but most of the plants are in fruit by that time. They apparently reach the height of their flowering in the latter part of May and the first week of June, although occasional flowers are to be found through the entire summer. The juice of the plant is very acrid, and when handled often causes irritation and blistering of the skin

Along Quatre Fourches river, No. 765, Fort Smith, Nos. 766, 2403, Pine Lake district, Nos. 2404, 2405, 2406, Peace point, No. 2407

Ranunculus aquatilis L., var. **capillaceus** DC. WHITE WATER BUTTERCUP.

Common in shallow lakes, ponds, and slow streams throughout the area, sometimes becoming a creeping mud plant. Found in flower from mid-June to mid-August, and with immature fruit August 14

Cree (Mamawi) creek, No. 2370, 30th base line district, Slave river, No. 729, Moose (Eight) lake, No. 2369, Little Buffalo river, *Russell*, No. 91

R. Cymbalaria Pursh. *Halerpestes Cymbalaria* (Pursh) Greene. SEASIDE BUTTERCUP.

Common on muddy slough and stream margins, particularly those of slightly saline nature and found mainly in the lowland districts. Collected in flower June 23, and with both flowers and fruit July 12 and August 8.

Government Hay Camp district, Slave river, No. 2366, Fort Smith, No. 733, Little Buffalo river, *Russell*, No. 65.

R. Purshii Richards. YELLOW WATER BUTTERCUP.

Common in slough ponds throughout the area. Flowers collected during the third week in June and through most of the summer. Fruits are matured during July and August.

30th base line district, Slave river, No. 734, Murdock Creek district, No. 2377, Government Hay Camp district, Slave river, Nos. 2378, 2379, Pine Lake district, Nos. 2375, 2376, base of eastern slope of Caribou mountains, No. 2374.

R. hyperboreus Rottb. ARCTIC BUTTERCUP.

Apparently rare in Wood Buffalo park, and known thus far only from a single specimen collected in the Salt Plain prairies. In flower August 20.

Near Heart (Raup) lake, No. 2368.

R. lapponicus L. LAPLAND BUTTERCUP.

Apparently rare in the region, and found thus far only on the Caribou Mountain plateau, where it grows in mossy muskeg thickets. Found with immature fruit July 12.

Eastern edge of Caribou Mountain plateau, No. 2359.

R. rhomboideus Goldie. PRAIRIE BUTTERCUP.

Apparently rare or occasional, and confined to the upland semi-open prairies. In flower and immature fruit June 17.

Pine Lake district, No. 2373.

R. sceleratus L. CELERY-LEAVED, or CURSED BUTTERCUP.

Common on wet pond and lake shores. Found in flower from the latter part of June through the remainder of the summer. Mature fruits collected as early as June 26. Plants very acrid, the juice often causing a blistering of the skin.

Lower delta of Athabaska river, No. 746, 30th base line district, Slave river, No. 745. Murdock Creek district, No. 2386, Government Hay Camp district, Slave river, No. 2385, near Heart (Raup) lake, No. 2384, Pine Lake district, Nos. 2382, 2387, Moose (Eight) Lake district, Nos. 2380, 2381, 2383, base of eastern slope of Caribou mountains, No. 2388.

R. abortivus L. SMALL-FLOWERED BUTTERCUP.

Occasional, and apparently confined to upland muskegs. In flower June 20, and fruit July 19. Juice from leaves known to cause blistering.

Pine Lake district, No. 2372, base of eastern slope of Caribou mountains, No. 2371.

R. tenellus Nutt.

Apparently rare in the park area, and collected thus far only at a slough margin along Peace river just inside the western boundary. With flowers and fruit July 31.

Indian graveyard, Peace river, No. 2367.

R. pennsylvanicus L. f. BRISTLY BUTTERCUP

Collected thus far only in the Peace-Athabaska delta, where it is common. Found in fruit July 11 and during the second week in August.

Lower delta of Athabaska river, No. 744, east shore of lake Mamawi, No. 2360.

R. Macounii Britton. MACOUN'S BUTTERCUP

Common in damp sloughs throughout the region. Flowers collected during the latter part of June and the first three weeks of July. Fruit begins to mature about mid-July and continues through most of August. Occasional flowers are found in early August.

Government Hay Camp district, Slave river, Nos. 2363, 2365, Fort Smith, No. 741. Round lake, about 18 miles south of Pine lake, No. 2361, Peace point, No. 2364, sink-hole 16 miles east of Moose lake, No. 2362.

R. acris L. FIELD BUTTERCUP.

Occasional in the region and apparently confined to the settled areas, where it is probably adventive. Collected in flower August 8, and with flowers and immature fruits August 18. The plants contain an acrid juice that has been known to cause blistering, vomiting, diarrhoea, and even death in animals.

Fort Smith district, No. 747, and *Russell*, No. 30.

Thalictrum sparsiflorum Turcz. MOUNTAIN RUE.

Rare in the region and known only from Caribou Mountain plateau, where it grows in muskegs. Collected in fruit July 12.

Eastern edge of Caribou Mountain plateau, No. 2435.

T. venulosum Trelease. MEADOW RUE

Common in prairie openings and open poplar woods throughout the upland districts, and abundant in the prairies at the base of Caribou mountains. The height of the flowering season is in the latter part of June and early July. Fruit is formed in the latter half of July and early August, and is falling off by August 20.

Near Mission Farm, No. 2439, near Heart (Raup) lake, No. 2432, Pine Lake district, Nos. 2440, 2441. Round lake, about 18 miles south of Pine lake, No. 2436. Peace point, Nos. 2433, 2437. sink-hole 16 miles east of Moose lake, No. 2430. Moose (Eight) lake, No. 2431, base of eastern slope of Caribou mountains, Nos. 2434, 2442, 2443, 2444.

PAPAVERACEAE

Corydalis sempervirens (L.) Pers. *Capnoides sempervirens* (L.) Borkh. PALE CORYDALIS.

Occasional in the park area, and collected thus far only in crevices on granite hills in the Peace delta and along the upper Slave river. In flower June 9, and with both flowers and fruit August 15.

Along Quatre Fourches river, No. 783, Government Hay Camp district, Slave river, No. 2443.

C. aurea Willd. *Capnoides aurea* (Willd.) Kuntze. GOLDEN CORYDALIS.

Common in cabin clearings and in the disturbed soil of river banks but abundant in recently burned areas. It is one of the pioneer plants in the new brûlés. Collected in flower and immature fruit during the latter part of June, and in various stages of flowering and fruiting through the remainder of the summer.

Government Hay Camp district, Slave river, No. 2441, Pine Lake district, No. 2440, near sink-hole 16 miles east of Moose lake, No. 2442, base of eastern slope of Caribou mountains, Nos. 2438, 2439, lower Slave river No. 781, Clew river, *Russell*, No. 97.

CRUCIFERAE

Draba nemorosa L. WHITLOW GRASS.

Common in dry prairies, clearings, and on sandy lake shores throughout the upland. A common weed of dry soils about the settlements, and an abundant inhabitant of ant hills and dry buffalo wallows. Found with flowers and fruit from the latter part of June through most of the summer.

Fort Smith, No. 808, Pine Lake district, Nos. 2446, 2449, 2450, sink-hole 16 miles east of Moose lake, No. 2447, base of eastern slope of Caribou mountains, Nos. 2444-a, 2445.

THLASPI ARVENSE L. PENNY-CRESS.

Occasional as an adventive weed in the settled areas. In fruit August 12.

Government Hay Camp, Slave river, No. 2454.

Lepidium apetalum Willd. PEPPER-GRASS, BIRD-SEED.

Occasional in dry prairie openings and old buffalo wallows in the upland districts. Collected with flowers and immature fruit June 22, and with mature fruit August 20.

Near Heart (Raup) lake, No. 2453, Pine Lake district, No. 2451, sink-hole 16 miles east of Moose lake, No. 2452.

CAPSELLA BURSA-PASTORIS (L.) Medic. *Bursa Bursa-pastoris* (L.) Britton. SHEPHERD'S PURSE.

Adventive and common about the settlements. Collected with flowers and fruit June 23 and August 6.

Government Hay Camp, Slave river, No. 2462, Fort Smith, No. 797.

CAMELINA SATIVA (L.) Crantz. FALSE FLAX.

Adventive in the settled districts and in cabin clearings. Collected with flowers and maturing fruit July 8, and with all its pods mature August 6.

Government Hay Camp, Slave river, No 2459, Pine Lake ranger station, No. 2460.

NESLIA PANICULATA (L.) Desv. BALL MUSTARD.

Adventive in settled districts. Found with flowers and immature fruit during the first week in August.

Government Hay Camp, Slave river, Nos. 2457, 2458.

BRASSICA ARVENSIS (L.) Kuntze. *Sinapis arvensis* L. MUSTARD.

Adventive in the settled districts. Flowers and young pods collected August 4. The seeds are commonly used medicinally as a stimulant or emetic. Other species in this family have somewhat the same qualities or are used in poultices as counter-irritants.

Government Hay Camp, Slave river, No. 2456.

Sisymbrium salsuginosum Pall.

Probably common in the Salt Plain prairies, the only region in which it has been found thus far. Collected with flowers and immature fruit June 15, and with flowers and mature fruit August 20.

Near Heart Raupl lake, No. 2483, near Mission Farm, No. 2482.

Descurainia Richardsonii (Sweet) O. E. Schultz.

Probably occasional in clearings and prairies. Found with flowers and immature fruit July 6.

Pine Lake ranger station, No. 2463.

Specimens collected in upland prairies on July 5 are too young for definite determination.

Base of eastern slope of Caribou mountains, No. 2464.

Erysimum cheiranthoides L. *Cheiranthoides cheiranthoides* (L.) Link. WORM-SEED MUSTARD, TREACLE MUSTARD.

Common in open places on river banks and in cabin clearings throughout the area. In the prairies at the base of Caribou mountains it becomes very abundant, and its yellow flowers add much colour to the landscape. A predominating feature of the spring and early summer aspect of these prairies is the abundance of tall dead stalks of treacle mustard rising above the new green of the grasses. Early flowers appear about the middle of June, and immature fruit about the first week of July. Flowering is nearly over during the second and third weeks of August, and fruits are maturing in quantity.

East shore of lake Mamawi, No. 2471, Murdock Creek district, No 2475, near Heart Raupl lake, No. 2477. Fort Smith, No 799, Pine Lake district No 2472. Round lake, about 18 miles south of Pine lake No. 2476, Peace point, No. 2473, sink-hole 16 miles east of Moose lake, No. 2474, base of eastern slope of Caribou mountains, Nos. 2465, 2466, 2467, 2468, 2469, and 2470, lower Slave river, No. 798.

E. parviflorum Nutt.

Occasional and apparently confined to dry upland prairies. Found with flowers and immature fruit July 17, and with flowers and mature fruit August 20.

Near Heart (Raup) lake, No. 2478 Peace point, No. 2479.

Rorippa obtusa (Nutt.) Britton. *Radicula obtusa* (Nutt.) Greene.

Apparently rare, and found thus far only in a crevice on a granite hill in the Peace delta. Collected with flowers and maturing fruit August 16

East shore of lake Mamawi, No. 2514.

R. palustris (L.) Bess., var **glabrata** (Lunell) Victorin *See* Jour Bot. xlii. 225 (1924) and Cont Lab de Bot. Univ Montreal No. 17 (1930). WATER-CRESS, MARSH CRESS.

Common on the wet shores of lakes and sloughs throughout the park area. In some lowland sloughs it makes the predominating vegetation at the water's edge, where it is actively colonizing new areas by vegetative means Flowers collected as early as June 16 and throughout the summer whereas maturing fruit is not commonly found until late July or early August

30th base line Slave river No 800, Mardock Creek district No 2507 Government Hay Camp district. Slave river Nos 2506, 2509 Round lake, about 18 miles south of Pine lake, No 2510, Peace point, No. 2508 sinkhole 16 miles east of Moose lake, No. 2511 Moose (Eight) Lake district Nos. 2502, 2503, 2504, 2505, Indian graveyard, Peace river, No. 2513, base of eastern slope of Caribou mountains, No. 2512.

R. palustris (L.) Bess., var **hispida** (Desv.) Rydb. *Radicula hispida* (Desv.) Britton, *R. palustris* (L.) Moench, var *hispida* (Desv.) Robinson.

Apparently occasional in the area, and found thus far only in a wet prairie on the Salt Plains. In fruit August 20.

Near Heart (Raup) lake, No. 2501

Cardamine pennsylvanica Muhl BITTER CRESS.

Common in upland muskegs, where it was collected with flowers and immature fruit June 20 and July 11.

Pine Lake district, Nos. 2480, 2481

Arabis lyrata L.

Occasional in upland meadows and on dry ridges. Collected with flowers and well-developed pods in mid-June and mid-July

Near Mission Farm. No. 2484, Moose (Eight) Lake district, No. 2485.

A. brachycarpa (T and G.) Britton.

Apparently rare and known only from the following locality, where it had immature fruit June 26

Pine Lake district, No 2486.

A. Drummondi Gray ROCK CRESS.

Occasional in upland prairies and open woods. Collected in flower June 15

Near Mission Farm, No. 2487, Pine Lake district, No. 2488.

A. retrofracta Gray

Occasional in dry prairies and upland woods, or on exposed sandy banks. In flower June 20 and maturing fruits during the first week in July

Pine Lake district, Nos. 2489, 2491, Peace point, No. 2490.

A. hirsuta (L.) Scop. HAIRY ROCK CRESS.

Common in upland prairies and clearings. Found in flower during the latter half of June and in fruit during the latter half of July and August.

Near Mission Farm, No. 2497, Pine Lake district, Nos. 2496, 2498, 2499, Peace point, No. 2500, sink-hole 16 miles east of Moose lake, No. 2495, base of eastern slope of Caribou mountains, Nos. 2492, 2493, 2494.

DROSERACEAE

Drosera rotundifolia L. SUNDEW

Apparently rare or occasional in the park area, and known thus far only from two specimens collected in an upland muskeg. Flowers were not quite out on July 9. Said to be poisonous to cattle.

Pine Lake district, No. 2515.

SAXIFRAGACEAE

Saxifraga tricuspidata Rottb. *Leptasea tricuspidata* (Rottb.) Haw. SAXIFRAGE.

Common on granite hills in Athabaska-Peace delta and along upper Slave river. Collected in flower June 9 and with a few late flowers August 7-8. Fruit is matured in August and probably earlier.

East shore of lake Mamawi, No. 2568, along Quatre Fourches river, No. 826, Government Hay Camp district, Slave river, No. 2567.

Heuchera Richardsonii R.Br. See Rhod. xxxv. 111-19 (1933). ALUM ROOT.

Common on the granite hills in Athabaska-Peace delta, where new rosettes were found June 9, and late flowers and maturing fruit August 8-9.

Along Quatre Fourches river, No. 847, east shore of lake Mamawi, No. 2550.

Mitella nuda L. BISHOP'S CAP.

A common species of rich spruce or spruce-poplar woodlands and timbered muskegs throughout the region. It usually grows in a thick mat of mosses. Collected in flower in the latter half of June and the first half of July. Fruits are matured in late July and in August.

30th base line, Slave river, No. 815, Government Hay Camp district, Slave river, No. 2562, Pine Lake district, No. 2563, Peace point, No. 2561, Moose Eight) Lake district, No. 2564, base of eastern slope of Caribou mountains, No. 2566, eastern edge of Caribou Mountain plateau, No. 2[illegible], Little Buffalo river, *Russell*, No. 83.

Chrysosplenium tetrandrum Fries. GOLDEN SAXIFRAGE.

Rare or occasional in the park area, and found thus far only in a single upland muskeg. Collected with flowers and immature fruits June 20.

Pine Lake district, No. 2551.

Parnassia multiseta (Ledeb.) Fernald. *P. palustris* of auth. *See* Rhod. xxvi, 211 (1928). Grass of Parnassus.

Common in muskegs and willow slough margins throughout the region. Flower buds collected July 8, but the height of the flowering season is not reached before late July and early August. Fruits are mature in the latter part of August.

Government Hay Camp district, Slave river, Nos. 2553, 2554, along Smith Portage road. No. 842, Pine Lake district, No. 2559. Moose (Eight) Lake district, Nos. 2558, 2555, 2556, 2557, base of eastern slope of Caribou mountains, No. 2560, Little Buffalo river, *Russell*, 77 (2).

P. montanensis Fernald and Rydb.

Occasional in the park area, and collected thus far only at the willow margin of an upland slough. In flower July 17.

Base of eastern slope of Caribou mountains, No. 2552.

Ribes oxyacanthoides L. Northern Gooseberry.

Common on rocky hills and in open woods and muskegs, but abundant in some of the semi-open prairies. The Indian name for the openings at the base of Caribou mountains is "Gooseberry Prairie," on account of the abundance of this species. Observed in flower June 12, and with immature fruit during late June and early July. The berries ripen in the latter part of July and in August.

East shore of Lake Mamawi, No. 2537, 30th base line district, Slave river, No. 852, Government Hay Camp district, Slave river, No. 2542, near Heart (Raup) lake, No. 2541, Pine Lake district, No. 2538, Peace point, No. 2540, Moose (Eight) Lake, No. 2539, base of eastern slope of Caribou mountains, Nos. 2532, 2533, 2534, 2535. Indian graveyard, Peace river, No. 2536, lower Slave river, No. 854.

R. hudsonianum Richards. Northern Black Currant.

Common in rich woods and timbered muskegs throughout the region. Collected in flower during most of June, and with immature fruit early in July. Berries ripen in the latter part of July and August.

Along Quatre Fourches river, No. 860, 30th base line district. Slave river, Nos. 859, 862, Government Hay Camp, Slave river, No. 2525, Pine Lake district, No. 2526. Moose (Eight) Lake district, Nos. 2519, 2520, 2521, 2522, 2523, 2524, base of eastern slope of Caribou mountains, No. 2518, eastern edge of Caribou Mountain plateau, Nos. 2516, 2517.

R. lacustre (Pers.) Poir. *Limnobotrya lacustris* (Pers.) Rydb. Swamp Currant.

Common in rich upland woods and timbered muskegs. Immature fruit collected during the second and third weeks in July, and ripe berries during mid August. The ripe berries have a bitter taste.

Pine Lake district, No. 2549, Moose (Eight) Lake district, Nos. 2546, 2547, 2548, eastern slope of Caribou mountains, No. 2544, eastern edge of Caribou Mountain plateau, Nos. 2543, 2545.

R. triste Pall. Wild Red Currant.

Common in rich woods throughout the region. Found in flower during the middle part of June, and with mature fruits in mid July.

Along Quatre Fourches river, No. 869; Pine Lake district, No. 2529; Peace point, No. 2527; Moose (Eight) Lake district, No. 2528; base of eastern slope of Caribou mountains, No. 2530.

ROSACEAE

Amelanchier florida Lindl. See Rhod. xiv. 117 (1912). Saskatoon or Service Berry.

A common shrub of dry woods, prairies, and river banks. In many places it produces an abundance of excellent fruit in late summer, and the berries have long been used as a constituent of pemmican. Flowers have been seen from June 9th to the first week in July, but the height of the flowering season is in the latter half of June. Fruits are well formed during the latter half of July, but usually do not ripen until the first week in August.

East shore of lake Mamawi, No. 2654; along Quatre Fourches river, No. 927; Government Hay Camp district, Slave river, No. 2652; along upper Slave river, No. 928; Fort Smith, No. 930; Pine Lake district, Nos. 2648, 2650, 2651; Peace point, No. 2653; Moose (Eight) Lake district, Nos. 2645, 2646, 2647; Indian graveyard, Peace river, No. 2655; base of eastern slope of Caribou mountains, Nos. 2656, 2657.

Rubus idaeus L. var. canadensis Richards. See Rhod. xxi. 90 (1919). Red Raspberry.

The common red raspberry of the region, and an abundant source of wild fruit in late summer. The species is abundant in open woods, clearings, prairies, and on rocky banks. Flower buds appear in mid-June, and most of the flowers during the first half of July. Immature fruits have been seen July 18, and ripe ones in late July and in August.

East shore of lake Mamawi, No. 2635; 30th base line district, Slave river, Nos. 881, 887; Government Hay Camp district, Slave river, No. 2627; Fort Smith, No. 865; Pine Lake district, Nos. 2630, 2631; Peace point, No. 2628; Moose (Eight) Lake district, No. 2629; Indian graveyard, Peace river, No. 2634; base of eastern slope of Caribou mountains, Nos. 2632, 2633; lower Slave river, No. 882.

R. idaeus L. var. strigosus (Michx.) Maxim. See Rhod. xxi. 98 (1919).

Rare or occasional in Wood Buffalo park, and found thus far only in open woods at the base of Caribou mountains. In flower June 30.

Base of eastern slope of Caribou mountains, No. 2626.

R. Chamaemorus L. Cloud or Mountain Berry. Bake-apple Berry.

Apparently rare or occasional in this region, and found thus far only in mossy muskegs in Caribou mountains. Immature fruit collected July 11-12.

Eastern edge of Caribou Mountain plateau, No. 2625.

R. pubescens Raf. *R. triflorus* Richards. of Gray's Man. 7th ed. See Rhod. xi. 236 (1909). Dwarf Raspberry.

Abundant in shady woodlands throughout the area. The height of its flowering season is about mid-June, but fruits do not mature until late

July or early August. The berries of this species are among the most delicious that the region affords, but they are comparatively scarce and do not ripen in sufficient numbers to be of much importance.

Along Quatre Fourches river, No. 880; Government Hay Camp, Slave river, No. 2619; Pine Lake district, Nos. 2617, 2621, 2623; Peace point, No. 2620; Moose (Eight) Lake district, Nos. 2622, 2624; Indian graveyard, Peace river, No. 2616; base of eastern slope of Caribou mountains, Nos. 2613, 2614, 2615.

R. acaulis Michx. *R. arcticus* L. var. *grandiflorus* Hook. ARCTIC RASPBERRY.

Abundant in rich woods and muskeg thickets throughout the region. Found in flower June 12, the height of the flowering season being in late June and early July. Nearly ripe fruits have been found July 18, and mature ones in late July and August.

30th base line district, Slave river, Nos. 871, 873; Government Hay Camp district, Slave river, Nos. 2638, 2639; Pine Lake district, Nos. 2636, 2637, 2640; Moose (Eight) Lake district, No. 2642; base of eastern slope of Caribou mountains, No. 2644; eastern edge of Caribou Mountain plateau, No. 2643; Little Buffalo river, *Russell*, No. 79.

Fragaria glauca S. Watson Rydb. WILD STRAWBERRY.

Abundant in dry open woods, prairies, clearings, and on rocky hills. It flowers from the early part of June through most of the summer, but the height of the flowering season is in the last third of June. The earliest ripe berries found by the writer were on July 19, and they become common in the latter part of July and the first part of August.

East shore of lake Mamawi, No. 2609; along Quatre Fourches river, No. 974; 30th base line district, Slave river, No. 970; Government Hay Camp district, Slave river, No. 2606; Fort Smith, No. 969; near Mission Farm, No. 2604; Pine Lake district, Nos. 2601, 2602, 2603; Peace point, No. 2605; Moose (Eight) Lake district, No. 2607; base of eastern slope of Caribou mountains, No. 2608; Little Buffalo river, *Russell*, No. 37.

F. vesca L. var. **americana** Porter.

Occasional, and found thus far only in the flood-plain forests along lower Peace river, where it was in fruit July 18 and August 1.

Peace point, No. 2612; Indian graveyard, Peace river, No. 2611.

Potentilla millegrana Engelm. CINQUEFOIL.

Occasional in the park area, where it may be adventive. Found only along upper Slave river in old gardens and cabin clearings. In fruit August 12.

Government Hay Camp, Slave river, No. 2681.

P. norvegica L. var. **hirsuta** (Michx.) Lehm. *P. monspeliensis* of auth. See Bibl. Bot. xvi, Heft 72, 404 (1908).

Abundant in wet meadows, slough margins, prairies, cabin clearings, and rock crevices throughout the region. Early flowers are found about June 20, and the height of the flowering season is reached in late June and the first part of July. Fruits begin to mature in mid-July.

East shore of lake Mamawi, No. 2692, lower delta of Athabaska river, No 963 Murdock Creek district No 2699 Government Hay Camp district, Slave river, Nos 2698. 2701, Fort Smith No 966, Pine Lake district, Nos. 2700. 2702, 2703, 2704, Round lake, about 18 miles south of Pine lake, No. 2705, sink hole 16 miles east of Moose lake No. 2709 Moose (Eight) lake Nos 2706 2707, 2708, 2710, Indian graveyard, Peace river, No. 2693, base of eastern slope of Caribou mountains, Nos. 2694 2695, 2696, 2697

P multifida L

Not found thus far in the park, but collected near Fort Smith by *Seton and Preble* in 1907, No. 78577 (Hb. Nat Mus Canada and Hb. N Y Bot Gard.)

P pennsylvanica L.

A common and highly variable species of dry prairies, sandy ridges, and rock hills Found in flower in mid-July and in fruit during late July and August The pubescence and cutting of the leaves are the most variable characters

East shore of lake Mamawi, Nos. 2718, 2719 Government Hay Camp district Slave river No 2711, near Heart (Raup) lake. No. 2712, Peace point Nos 2714 2715 2716 Moose (Eight) Lake district, No. 2713, base of eastern slope of Caribou mountains, No. 2717.

P. pulcherrima Lehm.

Apparently rare or occasional in the park area and found thus far only in the driest parts of the prairies at the base of Caribou mountains. Found in flower July 22 and 24

Base of eastern slope of Caribou mountains, No. 2687

P. Anserina L. *Argentina Anserina* (L.) Rydb. Silver Weed, Goose Tansy

Abundant in damp meadows and the drier parts of slough margins. In some places its silvery leaves make a distinct band around such openings. New rosettes collected June 12, and flowers June 19. Flowering continues throughout the summer

East shore of lake Mamawi, No 2682 30th base line district, Slave river, Nos 944 946, Government Hay Camp district, Slave river, No. 2683 Fort Smith No 943, Round lake about 18 miles south of Pine lake, No. 2685 sink-hole 16 miles east of Moose lake No. 2686, along Nyarling river, *Russell*, No. 52.

P. palustris (L.) Scop. *Comarum palustre* L. Marsh Cinquefoil.

Common at the margins of slough and mossy muskeg ponds. Early flowers found during the second week in July, and both flowers and fruit early in August

Pine Lake district, No 2727, Moose (Eight) Lake district, Nos. 2726, 2728.

P. tridentata Ait. *Sibbaldiopsis tridentata* (Ait.) Rydb. Three-toothed Cinquefoil.

Occasional on dry, sandy ridges and granite hills. Collected in flower July 11, and in fruit August 15.

Government Hay Camp district, Slave river, No. 2729, Pine Lake district, No. 2730.

P. fruticosa L. *Dasiphora fruticosa* (L.) Rydb. Shrubby Cinquefoil.

A common muskeg shrub throughout the upland districts and also found on sterile, stony ground. It sometimes grows in thickets where it makes up a large part of the muskeg cover, and at others is scattered through the timber. Early flowers found during the last third of June and occasional ones through most of the summer. The height of the flowering season is probably about mid July.

Near Heart (Raup) lake, No. 2721, Fort Smith, No. 961. Pine Lake district, Nos. 2722, 2723, 2725, Moose (Eight) Lake district, No. 2724, Little Buffalo river, *Russell*, No. 88.

P. arguta Pursh. *Drymocallis agrimonioides* (Pursh) Rydb.

Common in dry prairies and rock crevices. Found in flower early in July, and in fruit early in August.

East shore of lake Mamawi, No. 2690. Peace point, Nos. 2688, 2689, base of eastern slope of Caribou mountains, No. 2691.

Geum macrophyllum Willd. var. **perincisum** (Rydb.) Raup. *G. perincisum* Rydb. *G. oregonense* Rydb., not Scheutz. *See* Rhod. xxxiii, 178 (1931). Avens.

Common in prairies and sloughs throughout the region; and occasionally found in open woods. New rosettes collected June 12, and young inflorescences during the last week in June. The height of the flowering season is in the first half of July, and fruits are matured in late July and in August.

30th base line district, Slave river, No. 923, Murdock Creek district, No. 2589. Government Hay Camp district, Slave river, No. 2591, Fort Smith district, Nos. 922, 925, 926, Pine Lake district, Nos. 2590, 2592, Peace point, No. 2588, sink-hole 16 miles east of Moose lake, No. 2593. Moose (Eight) Lake district, Nos. 2594, 2595, 2596, Indian graveyard, Peace river, No. 2597, base of eastern slope of Caribou mountains, Nos. 2598, 2599, 2600, lower Slave river, No. 924.

G. strictum Ait.

Common in dry prairies and occasional in cabin clearings. Collected in flower during late June and most of July. Fruits mature in early August.

East shore of lake Mamawi, No. 2579. Pine Lake ranger station, No. 2574. Indian graveyard, Peace river, No. 2580, base of eastern slope of Caribou mountains, Nos. 2575, 2576, 2577, 2578.

G. triflorum Pursh. *Sieversia triflora* (Pursh) R.Br. Old Man's Whiskers.

Common on dry upland prairies and rocky hills. Late flowers and immature fruiting heads collected June 15 and 25. Fruits are matured in July and early August. During the latter part of July the Peace Point prairie is coloured pink by the abundance of fruiting styles of this species.

Government Hay Camp district, Slave river No 2587 near Mission Fo[illegible] No 2583 near Heart (Raup) lake, No 2586, Peace point, Nos. 2584 2585 base of eastern slope of Caribou mountains Nos 2581, 2582

Rosa acicularis Lindl Wild Rose.

All of the roses of the *acicularis* group in this region are much in need of careful study The writer has been unable thus far, to make any definite division among them although there are wide variations in stem, leaf and fruit characters The relationship of var *Bourgeauana* is not clear since the shape of the mature fruit is so inconstant On a granite hill at the east shore of lake Mamawi there is a form with very much elongated fruits that has also been placed in this species for the time being

Abundant in woods clearings prairies and on rocky hills throughout the park area Flower buds have been found June 9 and 13 but the height of the flowering season occurs late June and the first half of July Immature fruits appear during the third week in July and mature ones in August The wild roses are among the most abundant and striking summer flowers in the region The fleshy part of the fruit is often used for food

Rose portage upper Embarras river No 2660 east shore of lake Mamawi Nos 2658 2659 2667 (Nos 2658 2659 2660 are specimens with more elongated fruits) among Quatre Fourches river No 905 30th base line Slave river No 906 Government Hay Camp Slave river, No 2674 Fort Smith No 901 Pine Lake district Nos 2669 2670, Peace point Nos 2676 2677 Moose (Eight) Lake district Nos 2668, 2671, 2672 2673 2675 Indian graveyard Peace river No 2666, base of eastern slope of Caribou mountains Nos 2661 2665, eastern edge of Caribou Mountain plateau, Nos 2663, 2664.

R. Woodsii Lindl. Meadow Rose

Common on dry prairies and on rocky hills in the Peace delta. Collected with flowers and immature fruit July 17 to 19, and with mature fruit August 8.

East shore of lake Mamawi, No 2680 Peace point No 2678, base of eastern slope of Caribou mountains, No. 2679

Prunus pensylvanica L.f Pin Cherry Sand Cherry

Occasional in dry upland woods and on granite hills Collected with old flowers and immature fruits June 20 to 22 Fruits had all disappeared August 15 The ripened fruit is edible and is said to make very good jelly

Government Hay Camp district, Slave river, No 2572, Pine Lake district, Nos 2570, 2571

LEGUMINOSAE

Astragalus adsurgens Pall Milk Vetch

Occasional on dry sand ridges and prairies Collected in flower during mid-July

Peace point, No 2778, Moose (Eight) Lake district, No. 2779.

A. hypoglottis L. PURPLE MILK VETCH.

Common in semi-open prairies on the upland. Collected in flower June 15, and in fruit July 19 and August 3.

Near Mission Farm, No. 2768, Peace point, Nos. 2767, 2769, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 5.

A. alpinus L. *Trum alpinum* (L.) Rydb. ALPINE MILK VETCH.

Common in upland woods and prairies. Also found in burned areas and muskeg thickets. In flower during the latter half of June and early July. Mature fruit collected in the latter part of July and early August.

Near Heart (Raup) lake, No. 2775; Fort Smith, Nos. 994 (coll. *Mrs. Combear*) 995; Pine Lake district, Nos. 2771, 2772, 2773, 2774; Moose (Eight) Lake district, No. 2770; base of eastern slope of Caribou mountains, Nos. 2776, 2777; Lobstick creek, *Russell*, No. 4.

A. eucosmos B. L. Robinson.

Rare or occasional, and collected thus far only on an island flood-plain in upper Slave river. Young flowers were developing on June 18. 30th base line, Slave river, No. 991.

A. frigidus (L.) Gray, var. **americanus** (Hook.) S. Wats. *Phaca americana* (Hook.) Rydb. ARCTIC MILK VETCH; RATTLE-POD.

Common in open woods and muskeg thickets throughout the area. It is occasionally found in semi-open prairies, but is probably commonest in open aspen woods. Young plants not yet in flower collected June 20, and early flowers late in June and early in July. Immature fruits may be found in the latter half of July, and mature ones in early August.

Government Hay Camp district, Slave river, No. 2760; Pine Lake district, Nos. 2757, 2758; Peace point, Nos. 2759, 2761; Moose (Eight) Lake district, Nos. 2752, 2753, 2754, 2755, 2756; base of eastern slope of Caribou mountains, Nos. 2762, 2763, 2764, 2766; eastern edge of Caribou Mountain plateau, No. 2765.

A. tenellus Pursh. *Homalobus tenellus* (Pursh) Britton.

Apparently rare in Wood Buffalo park, and collected thus far only on the Peace Point prairie, where it had both flowers and fruit July 17 to 19.

Peace point, Nos. 2780, 2781.

Oxytropis splendens Dougl. LOCOWEED.

A large part of the writer's material may possibly be placed in var. *Richardsonii*, but the value of this variety is rather doubtful when a large series of intergrading specimens is taken into consideration. Therefore, pending further study, they have been classified as above.

Common in dry upland prairie openings and on sandy ridges. Rosettes are just getting started in the middle part of June, and early flowers are formed during the second week in July. Flowering appears to be at its height in the latter half of July, and fruits are matured in mid-August and later. Other species of this genus are known to be poisonous to stock, causing the disorder known as "loco," but no definite records are available for the one here listed.

Near Heart (Raup) lake, No. 2735, Peace point, Nos. 2733, 2734, sink-hole 16 miles east of Moose lake, No. 2732, Moose (Eight) Lake district Nos. 2736, 2737.

Hedysarum alpinum L., var **americanum** Michx.

Common in upland open woods and prairies. Flower buds collected June 20 and mature fruit early in August. The height of the flowering season appears to be about mid-July.

Government Hay Camp district, Slave river, No. 2807, near Heart (Raup) lake, Nos. 2804, 2806, Pine Lake district, No. 2805, Peace point, No. 2803.

H. Mackenzii Richards.

Occasional in Wood Buffalo park. Found in woods and thickets in both upland and lowland areas. Flowers collected during the second and third weeks of June.

Along lower Peace river, near the Slave, No. 1005, 30th base line district, Slave river, No. 1004, Salt mountain, No. 2802.

Vicia americana Muh. VETCH

Abundant in cabin clearings, open woods, and prairies throughout the area. It makes a substantial contribution to the supply of natural feed. Early flowers appear in late June and early July, and fruit is mature in late July and August.

East shore of lake Mamawi No. 2783, Government Hay Camp district, Slave river, Nos. 2796, 2798, near Heart (Raup) lake No. 2795, Fort Smith No. 1006, Pine Lake district, Nos. 2788, 2789, 2790, Round lake about 18 miles south of Pine lake, No. 2800, Peace point Nos. 2791, 2792, 2793, Moose (Eight) Lake district, Nos. 2787, 2797, 2799, Indian graveyard, Peace river No. 2784, base of eastern slope of Caribou mountains Nos. 2782, 2786, eastern edge of Caribou Mountain plateau, No. 2785, Little Buffalo river *Russell*, No. 33, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 61.

V. americana Muhl., var **angustifolia** Nees.

Occasionally found in sloughs and on sand ridges. It is probably only a form of the species. Young plants not yet in flower collected June 12 and with immature fruit July 13.

30th base line district, Slave river, No. 1010, Moose (Eight) Lake district, No. 2801, lower Slave river, No. 1009.

Lathyrus ochroleucus Hook. PEA-VINE, VETCHLING.

Abundant in prairies, clearings, and dry open woods. One of the most important sources of forage in the poplar woods that form part of the summer range of the buffalo. Young plants not yet in flower or with a few early flowers are well started during the second week in June, whereas mature fruits are not commonly found much before the first of August. The height of the flowering season is about the last of June and the first of July.

Along Quatre Fourches river, No. 989, 30th base meridian district, Slave river, No. 988, Government Hay Camp district, Slave river, No. 2745, Fort Smith, No. 986, Pine Lake district, Nos. 2746, 2748, Peace point, Nos. 2742, 2743, 2744, Mouse (Eight) Lake district, Nos. 2747, 2750, 2751, Indian graveyard, Peace river, No. 2738, base of eastern slope of Caribou mountains, No. 2740, eastern edge of Caribou Mountain plateau, No. 2739, Little Buffalo river, *Russell*, No. 31.

GERANIACEAE

Geranium Bicknellii Britton. CRANE'S-BILL, WILD GERANIUM.

Common in open upland woods but abundant in recently burned areas. In new blackened brûlé it is one of the first plants to get started and grows rankly. In flower during the latter part of June and the first half of July. Fruits begin to mature about mid July.

Along trail about 10 miles southwest of Fitzgerald, No. 2809; sink-hole 16 miles east of Moose lake, No. 2810, eastern slope of Caribou mountains, No. 2811.

LINACEAE

Linum Lewisii Pursh. WILD BLUE FLAX.

Apparently occasional, and found thus far only in dry Salt Plain prairies. In fruit August 20.

Near Heart (Raup) lake, No. 2808.

CALLITRICHACEAE

Callitriche hermaphroditica L. *See* Rhod. xxv, 211 (1923), and Vierteljahrsch. Nat. Ges. Zür. 53[4] (1909) 548.

Common in ponds and slow streams throughout the area. Collected in fruit during the middle part of August.

Cree (Mamawi) creek, No. 2812, sink hole 16 miles east of Moose lake, No. 2813.

EMPETRACEAE

Empetrum nigrum L. CROWBERRY.

Occasional in Wood Buffalo park, and confined to upland muskegs and rich woods.

Near Heart (Raup) lake, No. 2814, eastern edge of Caribou Mountain plateau, Nos. 2815, 2816.

BALSAMINACEAE

Impatiens Noli-tangere L. JEWEL-WEED, TOUCH-ME-NOT.

Rydberg(42) places all American material here related in *I. occidentalis* Rydb. (43). The writer has compared his own specimens as well as other American ones (including a duplicate of Rydberg's type of *I. occidentalis*) with a considerable number of Eurasian specimens of *I. Noli-tangere* in the Gray Herbarium, and can see no reason for separating them.

Collected thus far only in rich woods in the upper delta of Athabaska river. In flower August 15.

Reed portage, upper Embarras river, No. 2818.

Impatiens sp.

These specimens are too young to be identified and although they are there seedlings they have produced some cleistogamous flowers and fruits. All of the material (about seventy plants) came from a space about 10 inches in diameter from about eighty seeds which still cling to the roots. Found in the moss mat of a timbered upland muskeg.

Base of eastern slope of Caribou mountains, No. 2817.

VIOLACEAE

Viola nephrophylla Greene.

Apparently rare, and collected thus far only in an upland sink-hole prairie. Found with flower and fruit August 20.

Sink-hole 16 miles east of Moose lake, No. 2830.

V. rugulosa Greene. CANADA VIOLET

This material is scarcely separable from *V. canadensis*. There is a little more hairiness on the veins of the leaves than in *canadensis*, but the presence or absence of "underground stolons" seems of doubtful value in separating the two.

Common in open poplar woods on the upland. Collected in flower during the latter part of June, and with flowers and fruit in mid-July.

Peace point, No. 2828, base of eastern slope of Caribou mountains, Nos. 2826, 2827.

V. adunca J. E. Smith.

Common in upland semi-open prairies and rock crevices. Found in flower during the latter half of June and early July. Mature fruit collected in July and August.

East shore of lake Mamawi, No. 2824. Pine Lake district, Nos. 2820, 2822, 2823. Sink-hole 16 miles east of Moose lake, No. 2819, base of eastern slope of Caribou mountains, No. 2829.

ELAEAGNACEAE

Elaeagnus argentea Pursh. *E. commutata* Bernh. SILVER-BERRY, SILVER-BUSH.

Occasional on upland prairies and lake shores. Abundant along Salt river at Mission Farm. Collected in flower from mid-June through the first week of July. The ripe berries are edible.

Near Heart (Raup) lake, No. 2831; near Mission Farm, No. 2833; Pine lake, No. 2832.

Shepherdia canadensis (L.) Nutt. *Lepargyrea canadensis* (L.) Greene. BUFFALO-BERRY, BUCK BRUSH.

A common shrub of woods and thickets throughout the area. Its berries are used by the Indians to make a drink. Mature fruit produced during July and August.

East shore of lake Mamawi, No. 2841; along Quatre Fourches river, No. 1035; 30th base line district, Slave river, No. 1036; Government Hay Camp district, Slave river, Nos. 2835, 2836; Fort Smith, No. 1034, Pine Lake district, Nos. 2837, 2838; Moose Eight-Lake district, Nos. 2834, 2840; base of eastern slope of Caribou mountains, Nos. 2839, 2842; Bear river, *Russell*, No. 36.

ONAGRACEAE

Epilobium angustifolium L. *Chamaenerion angustifolium* (L.) Scop. Fireweed, Willow herb.

Abundant in open woods, clearings, prairies, and burned areas throughout the region. It appears very soon after clearing and burning, and supplies a blaze of colour to what would otherwise be a dreary aspect. Young shoots common during most of June, and buds late in June or early in July. The first flowers usually appear during the first week in July, but the height of the flowering season is in the latter part of July and early August. Poultices made from the rootstocks are said to have healing qualities.

Along Quatre Fourches river, No. 1066, 30th base line district, Slave river, No. 1065, Government Hay Camp, Slave river, No. 2862, Fort Smith, Nos. 1053 (coll. *Mrs. Conibear*), 1056, Moose (Eight) Lake district, No. 2861, base of eastern slope of Caribou mountains, Nos. 2858, 2859, 2860, Clewi river, *Russell*, No. 95.

E. palustre L.

Common in muskegs and wet meadows throughout the region. Collected in flower during most of July, and in fruit during August.

East shore of lake Mamawi, No. 2845. Murdock Creek district, No. 2855, near Heart Raup lake, No. 2853, Pine Lake district, No. 2852, Observation ridge, about 10 miles south of Pine lake, No. 2854, Moose (Eight) Lake district, Nos. 2851, 2856, 2857. Indian graveyard, Peace river, No. 2846, base of eastern slope of Caribou mountains, Nos. 2847, 2849, 2850, eastern edge of Caribou Mountain plateau, No. 2848, Little Buffalo river, *Russell*, No. 76.

E. palustre L. var. **monticola** Haussk.

Occasional in lowland wet meadows. Collected in fruit August 2.

Government Hay Camp district, Slave river, No. 2844.

E. glandulosum Lehm., var. **adenocaulon** (Haussk.) Fernald. *E. adenocaulon* Haussk. *See* Rhod. xx, 35 (1918).

Common in sloughs and wet meadows. Collected in flower during mid-July, and in fruit in August.

East shore of lake Mamawi, No. 2870, lower delta of Athabaska river, No. 1049. Murdock Creek district, No. 2863, Round lake, about 18 miles south of Pine lake, No. 2864, Moose (Eight) Lake district, Nos. 2865, 2866, 2867, 2868, Indian graveyard, Peace river, No. 2869, base of eastern slope of Caribou mountains, Nos. 2871, 2872.

Circaea alpina L. Enchanter's Nightshade.

Rare in this region, and collected thus far only in the upper delta of Athabaska river. With immature fruit August 15.

Reed portage, upper Embarras river, No. 2843.

HALORAGIDACEAE

Myriophyllum exalbescens Fernald *M. spicatum* L. of auth. *See* Rhod. xxi, 120 (1919) WATER MILFOIL.

Abundant in the shallow water of slough ponds and sluggish streams. Collected with flowers during the first half of August, and with immature fruit August 15.

Cree (Mamawi) creek No. 2882 Murdock Creek district, No. 2884; Moose (Eight) lake, Nos. 2883, 2885, 2886.

HIPPURIDACEAE

Hippuris vulgaris L. MARE'S-TAIL.

Common in the shallow water on the shores of ponds and slow streams. Collected in flower in late June and late July. Fruits are matured in August.

Lower delta of Athabaska river No. 1077 Murdock Creek district, Nos. 2877, 2878 Government Hay Camp district, Slave river, No. 2879, near Heart (Raup) lake, No. 2880 Pine Lake district, Nos. 2874, 2876, sink-hole 16 miles east of Moose lake No. 2875, Moose (Eight) Lake district No. 2881 base of eastern slope of Caribou mountains, No. 2873, Sass creek, *Russell* No. 39.

ARALIACEAE

Aralia nudicaulis L. WILD SARSAPARILLA.

Common in open (chiefly poplar) woods on the uplands, and in crevices on the granite hills. Flower buds collected June 9, and flowers June 22. Fruit matures in the latter part of July or in August.

Along Quatre Fourches river No. 1082, Pine Lake district, No. 2888, Peace point No. 2887 base of eastern slope of Caribou mountains, No. 2889.

UMBELLIFERAE

Cicuta occidentalis Greene WATER HEMLOCK, BEAVER POISON.

Occasional in wet meadows throughout the area, and common in a few places. New rosettes were collected June 12 flowers during July, and immature fruit in the first three weeks of August. The whole plant is very poisonous, especially the root which is occasionally taken for parsnip. It causes convulsions, and if eaten in quantity causes death.

Lower delta of Athabaska river, No. 1086, east shore of lake Mamawi, No. 2890, 30th base line district, Slave river No. 1088 near Heart (Raup) lake, No. 2891, Moose (Eight) lake, No. 2892.

C. bulbifera L.

Apparently only occasional in the park area, although it is common on the marshy shores of Moose lake. In flower and with maturing bulblets during the first half of August. Very poisonous, producing disorders similar to those of *C. occidentalis*.

Moose (Eight) lake, Nos. 2893, 2894.

Sium suave Walt. *S. cicutaefolium* Gmel. of auth *See* Rhod xvii, 131 (1915) WATER PARSNIP

Common in wet meadows and marshy slough margins throughout the region New rosettes were collected June 12 and 20. Flowers appear in the early part of July and fruit in the latter part of August. Reported poisonous in some regions

East shore of lake Mamaw , No 2898, lower delta of Athabaska river, No 1090, 30th base line district Slave river No 1092 Murdock Creek district, No 2902, near Heart (Rampart) lake, No 2903, Pine Lake district No 2901 sink-hole 16 miles east of Moose lake No. 2905 Moose (Eight) Lake district, No 2904 Indian graveyard Peace river, No. 2899 base of eastern slope of Caribou mountains, No 2900.

Heracleum lanatum Michx Cow PARSNIP.

Apparently only occasional in the park area, although it is common in parts of the prairies at the base of Caribou mountains Collected with flowers and immature fruits during the middle part of July

Base of eastern slope of Caribou mountains, Nos. 2895 2896. 2897

CORNACEAE

Cornus canadensis L *Chamaepericlymenum canadense* (L) Aschers and Graebn DWARF DOGWOOD, BUNCH-BERRY

Abundant in open woods and common in the richer woods It may be found flowering during most of June and July, but reaches its height about the first two weeks of July The berries ripen and turn red about mid August The ripe berries are edible.

Along Quatre Fourches river, No 1097, Government Hay Camp district Slave river No. 2916, Fort Smith. No. 1096 Pine Lake district No 2917, Moose (Eight) Lake district Nos 2918 2919, 2920, base of eastern slope of Caribou mountains, No 2914 eastern edge of Caribou Mountain plateau, No 2915, Little Buffalo river, *Russell*, No. 70

C. stolonifera Michx *Studa Opiz* RED "WILLOW," KINNIKINNIK.

Part of the material cited below, Nos. 2907 and 2908, may be referable to var *Baileyi* (Coult. and Evans) Drescher

Common on the high banks of streams and lakes throughout the area, and occasionally found at prairie margins. It reaches its greatest abundance in newly developed flood-plain timber Young leaves and flower buds collected in early and middle June the height of the flowering season being in late June and early July Late flowers are often found in August. Fruits begin to mature in the latter part of July, and turn white about mid-August Bears are very fond of the ripe berries. The bark, when peeled off, dried, and ground up, is a popular substitute for tobacco Many users prefer a mixture with this 'kinnikinnik' to straight tobacco

East shore of lake Mamaw, No. 2910, along Quatre Fourches river No. 1099 30th base line district Slave river, Nos 1103, 1104 Government Hay Camp district Slave river No. 2909, near upper Smith rapids. No 1101, Pine Lake district. No 2906, Peace point, No 2907 Moose (Eight) Lake district No 2908 Indian graveyard, Peace river No 2913 base of eastern slope of Caribou mountains, Nos 2911, 2912.

PYROLACEAE

Moneses uniflora (L.) Gray. ONE-FLOWERED SHIN-LEAF.

Common in upland timbered muskegs and very rich mossy woods. The height of its flowering season is about mid-July.

Near upper Smith rapids, No. 1105, Pine Lake district, Nos. 2961, 2962. Moose (Eight) Lake district, No. 2960, base of eastern slope of Caribou mountains, No. 2964, eastern edge of Caribou Mountain plateau, No. 2963, Little Buffalo river. *Russell*, No. 68.

Pyrola secunda L. *Ramischia secunda* (L.) Garcke.

Common in rich woods and timbered muskegs. Like other species of this genus the height of its flowering period appears to be in the first two weeks of July, though a few flowers are found as late as August, when most of the fruit is maturing.

Government Hay Camp district, Slave river, Nos. 2926, 2927, Pine Lake district, No. 2921, Peace point, No. 2922. Moose (Eight) Lake district, Nos. 2923, 2924, 2925, 2928. Indian graveyard, Peace river, No. 2932, base of eastern slope of Caribou mountains, Nos. 2929, 2930, eastern edge of Caribou Mountain plateau, No. 2931, Little Buffalo river, *Russell*, No. 71.

P. chlorantha Sw. See Rhod. xxii. 49 (1920).

Common in woods throughout the upland districts, where it is in bud during mid-June, and at the height of its flowering season in the first half of July.

Pine Lake district, Nos. 2937, 2938, 2939, Peace point, No. 2936, Moose (Eight) Lake district, Nos. 2933, 2940, base of eastern slope of Caribou Mountain plateau, Nos. 2934, 2935.

P. asarifolia Michx.

Common in poplar and spruce woods throughout the region, and one of the most striking flowers. Fruit is matured in August. Var. *incarnata* has the same habitat and flowering period.

Along Quatre Fourches river, No. 1113. Government Hay Camp district, Slave river, No. 2946, near upper Smith rapids, No. 1114. Fort Smith, No. 1111. Pine Lake district, Nos. 2944, 2945. Moose (Eight) Lake district, Nos. 2941, 2942, 2943, base of eastern slope of Caribou mountains, Nos. 2947, 2948.

P. asarifolia Michx. var. **incarnata** (Fisch.) Fernald.

Common in the same range and habitat as the species, and in many cases not clearly distinguished from it.

Government Hay Camp district, Slave river, No. 2949, Salt mountain, No. 2959, Pine Lake district, Nos. 2954, 2955, 2956, Peace point, No. 2950, Moose (Eight) Lake district, Nos. 2951, 2952, 2953, base of eastern slope of Caribou mountains, Nos. 2958, 2959. Little Buffalo river, *Russell*, No. 84.

Monotropa uniflora L.

Not found by the writer in Wood Buffalo park, but collected somewhere along Slave river by *Miss E. Taylor* in 1892 (Hb. Nat. Mus. Canada and Hb. Gray).

Ledum groenlandicum Oeder LABRADOR TEA.

A common shrub in muskegs throughout the region. Its dried leaves have been used commonly to make a native tea. The height of its flowering season is in late June and early July. Fruit is matured in August.

Pine Lake district, No. 2982, Moose (Eight) Lake district, Nos. 2983, 2984, 2985, base of eastern slope of Caribou mountains, No. 2980, eastern edge of Caribou Mountain plateau, No. 2979, "Wood Buffalo Park," *Russell*, No. 56.

L. palustre L. var. **decumbens** Ait. NARROW-LEAVED LABRADOR TEA.

Apparently rare, and collected thus far only from a muskeg in Caribou mountains, where it had immature fruit in mid-July.

Eastern edge of Caribou Mountain plateau, No. 2986.

Kalmia polifolia Wang.

Reported in Fort Smith district, but not seen by the writer. Known on lake Athabaska and at Resolution.

Andromeda polifolia L. BOG ROSEMARY.

Rare or occasional in the park area, and collected thus far only from a single upland muskeg. It grows on open mossy hummocks, and had immature fruit July 9.

Pine Lake district, No. 2987.

Chamaedaphne calyculata (L.) Moench CASSANDRA, LEATHER-LEAF.

Occasional in cold upland muskegs. Collected thus far only in Pine Lake district and in Caribou mountains, where it is a colonizing shrub in hummocks of *Sphagnum*. Immature fruit collected in mid-July.

Pine Lake district, No. 2977, eastern edge of Caribou Mountain plateau, No. 2978.

Arctostaphylos Uva-ursi (L.) Spreng. BEARBERRY. KINNIKINNIK.

Common on sandy and rocky hills, and in dry upland woods. Found in flower during most of June, and with green berries in July. Fruit is usually not matured until August. The dried leaves have been used as a substitute for tobacco.

East shore of lake Mamawi, Nos. 2999, 3000, along Quatre Fourches river, No. 1171, Pine Lake district, Nos. 2995, 2996, Peace point, No. 2994, Moose (Eight) Lake district, Nos. 2993, 2997, eastern edge of Caribou Mountain plateau, No. 2998.

A. rubra (Rehder and Wilson) Fernald. *A. alpina* (red-fruited form) Richards. *Mairania alpina* (red-fruited form) Britton and Rydb. *Arctous* (Gray) Nieduz. Sec. Rhod. xvi. 32 (1914). ALPINE BEARBERRY.

Common in muskeg timber throughout the upland. The bright red berries are very tart in flavour. Fruit collected during July and August.

Pine Lake district, No. 2991, Moose (Eight) Lake district, Nos. 2990, 2992, base of eastern slope of Caribou mountains, Nos. 2988, 2989.

Vaccinium canadense Kalm *Cyanococcus canadensis* (Richards.) Rydb. CANADA BLUEBERRY

Occasional on granite hills and in dry upland woods. In a few localities it becomes abundant and produces small but delicious berries in large numbers. Collected in fruit during mid-August, when the berries appear to be at their best.

Government Hay Camp district, Slave river, No. 2965, near sink-hole 16 miles east of Moose lake, No. 2966.

V Vitis-idaea L., var **minus** Lodd. *Vitis-Idaea Vitis-Idaea* (L.) Britton. MOUNTAIN CRANBERRY

Abundant in upland woods throughout the region. Collected in flower from mid-June to mid-July, and occasionally later. Fruits mature in August.

Along Quatre Fourches river, No. 1201, Fort Smith, No. 1194, Pine Lake district, Nos. 2970, 2971, Moose (Eight) Lake district, Nos. 2972, 2973, 2974, base of eastern slope of Caribou mountains, No. 2976, eastern edge of Caribou Mountain plateau, No. 2975.

V Oxycoccos L. *Oxycoccus Oxycoccos* (L.) MacM. SMALL CRANBERRY

Common on *Sphagnum* hummocks in cold upland muskegs. Collected with flowers and immature fruit about mid July. The berries are too small to be of importance.

Pine Lake district, No. 2967, Moose (Eight) Lake district, No. 2968, eastern edge of Caribou Mountain plateau, No. 2969.

PRIMULACEAE

Primula incana M. E. Jones, *See* Rhod. xxx, 59 (1928) PRIMROSE

Common in damp meadows and prairies. Collected in flower in mid-June and in fruit in August. Occasional flowers are to be found even in the latter part of August.

Government Hay Camp district, Slave river, No. 3010, near Heart (Raup) lake, No. 3011, near Mission Farm, No. 3012, sink-hole 16 miles east of Moose lake, No. 3013.

Androsace septentrionalis L. *See* Mem. 126, No. 4, Biol. Ser., Dept. of Mines, Canada, 45 (1922)

Occasional on dry sandy banks and granite hills. Collected with flowers and immature fruit during the latter half of June and early in July, and with mature fruit August 9.

Fort Smith, Nos. 1232, 3006, Pine Lake district, No. 3007, east shore of lake Mamawi, No. 3005.

Dodecatheon pauciflorum (Durand) Greene SHOOTING STAR.

Abundant in semi-open prairies on the Salt Plains. At the height of its flowering period about June 15, it turns the meadows purple with its abundance of blossoms. Fruit begins to mature early in July.

Near Mission Farm, No. 3001, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 1.

Lysimachia thyrsiflora L. *Naumburgia thyrsiflora* (L.) Duby TUFTED LOOSESTRIFE.

Occasional along upland creek banks, where it grows near the water's edge. Collected thus far only in the northern area, but observed by the writer along Little Buffalo river near Nonshith hills. Found in flower during the first half of July.

Sass creek, *Russell*, No. 26

Trientalis europaea L., var **arctica** (Fisch.) Ledeb. *T. arctica* Fisch. ARCTIC STAR FLOWER.

American material was considered to represent a distinct species, *T. arctica*, by Fischer (27), and is commonly so labelled. However comparison with Eurasian specimens in the Gray Herbarium shows clearly that it is a mere regional variety and very closely related to the species.

Abundant in rich woods at the base of Caribou mountains. The writer has seen it nowhere else in the park, but it was collected by Russell in the northern area, where he reports it "In woods, not common." The height of its flowering season is about the last of June.

Base of eastern slope of Caribou mountains, Nos. 3003, 3004; junction of Nyarling and Little Buffalo rivers, *Russell*, No. 57 (the writer has not examined this specimen).

Glaux maritima L. SEA MILKWORT.

Abundant at the margins of barren saline flats and brine springs. Collected in flower June 15.

Near Heart (Raup) lake, No. 3009; near Mission Farm, No. 3008, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 72 (2).

GENTIANACEAE

Gentiana elegans A. Nels. *Anthopogon* Necker. FRINGED GENTIAN.

The writer's collections of this species are extremely variable in size and habit of growth. They closely resemble the general description of plants labelled *G. Macounii* Holm (45), but do not have hairs on the lower parts of the filaments. The entire group needs critical study and the Wood Buffalo Park material may prove to have some other identity, but for the time being it will be considered as above.

Abundant in the Salt Plain prairies, where it adds much colour to the early autumn landscape. The height of the flowering season appears to be in the first three weeks of August. It is occasionally found in both upland and lowland wet meadows outside the Salt Plains.

Government Hay Camp district, Slave river, No. 3027, near Heart (Raup) lake, No. 3028, sink-hole slough 16 miles east of Moose lake, No. 3026, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 66.

G. Amarella L. *Amarella plebeia* (Chan.) Greene, *See.* Rhod. xix 149-51 (1917). GENTIAN.

Common to a variety of habitats—damp meadows, muskegs and open timber. The first flowers appear during the last week of July, and fruit about the second or third week in August. Its purple flowers are inconspicuous but brightly coloured.

East shore of lake Mamawi, No. 3037, Government Hay Camp district, Slave river Nos 3032 3033, near upper Smith rapids, No 1238, sink-hole 16 miles east of Moose lake No 3030 Moose (Eight) Lake district, Nos. 3029 3031, Indian graveyard Peace river No 3036, base of eastern slope of Caribou mountains, Nos. 3034, 3035, Little Buffalo river, *Russell*, No. 45.

Lomatogonium rotatum (L. Fries. *Picurogyne rotata* (L.) Griseb *P. fontana* A. Nels. *See* Rhod. xxi. 197 (1919) MARSH FELWORT

Common in damp meadows and muskeg thickets in the Salt Plain region. Collected in flower during the first three weeks of August.

Near Heart (Raup) lake, No 3040, Little Buffalo river, *Russell*, No. 93, Clew river, *Russell*, No. 96.

Menyanthes trifoliata (L.) *See* Rhod. xxx. 195 (1929) BUCKBEAN.

The writer has been unable to distinguish the variety *minor* Michx. in the limited collections at hand. Further material and study, therefore, may alter the present determination.

Common on mossy shores of upland muskeg ponds, where it is a pioneer plant in the quaking bogs. Collected with late flowers and immature fruit July 9. Suspected of being poisonous.

Pine Lake district, No. 3039, Moose (Eight) lake, No. 3038.

APOCYNACEAE

Apocynum androsaemifolium L. DOGBANE

Collected thus far only at Fort Smith. Said to be poisonous to stock. A serviceable fibre has been made from the stems.

Fort Smith No. 1239 (*Mrs. Conibear* coll.)

A. sibiricum Ait. *A. hypericifolium* Jacq. *A. cannabinum* L. var. *hypericifolium* (Ait.) Gray INDIAN HEMP

Collected thus far only on the gypsum cliffs at Peace point, where it was in flower in late July and early August.

Peace point, No. 3025.

POLEMONIACEAE

Collomia linearis Nutt. *Gilia lucens* (Nutt.) Gray

Occasional in the driest parts of the prairies at the base of Caribou mountains and in a small prairie opening on a granite hill in the Peace delta. Collected in flower during the third week in July, and in fruit early in August.

East shore of lake Mamawi, No. 3023, base of eastern slope of Caribou mountains, Nos. 3022, 3024.

HYDROPHYLLACEAE

Phacelia Franklinii (R.Br.) Gray SCORPION-WEED.

Common in openings and clearings throughout the upland districts. It becomes abundant in recently burned areas, where it is a "fireweed" with *Geranium Bicknellii* and *Dracocephalum parviflorum*. Its flowering period begins about June 20, and continues through most of July. Most of the fruit is set by August 20.

Pine Lake district, Nos. 3015, 3016, 3017, 3018, 3019, 3021, sink-hole 16 miles east of Moose lake, No. 3020, base of eastern slope of Caribou mountains, No. 3014.

BORAGINACEAE

Lappula Redowskii (Hornem.) Greene, var **occidentalis** (S. Wats.) Rydb. Stickseed.

Apparently rare in the region, and collected thus far only in an upland sink hole prairie opening. In fruit (with a few flowers) August 20.

Sink-hole 16 miles east of Moose lake, No. 3199.

Hackelia deflexa (Wahl.) Opiz, var **americana** (Gray) Fernald and Johnston. *Lappula americana* (Gray) Rydb. *Hackelia deflexa* (Wahl.) Opiz of Am. auth. *See* Rhod. xxvi, 124 (1924).

Apparently rare or occasional in Wood Buffalo park, and collected thus far only in a cabin clearing along upper Slave river. With fruit and a few flowers July 25.

30th base line district, Slave river, No. 3200.

Mertensia paniculata (Ait.) Don. Lungwort, Blue Bells.

A common species of open woods, cabin clearings, and parts of the semi-open prairies. Its showy blossoms give considerable colour to the prairies at the base of Caribou mountains when the flowering season is at its height, about the last of June and early July. Fruits are matured in August.

Along Quatre Fourches river, No. 1244, Government Hay Camp Slave river, Nos. 3208, 3209, Peace point, No. 3207, Moose (Eight) Lake district, Nos. 3210, 3211, 3212, base of eastern slope of Caribou mountains, Nos. 3201, 3202, 3203, 3204.

LABIATAE

Scutellaria epilobiifolia Hamilton. *S. galericulata* Am. auth., not L. *See* Rhod. xxiii, 88 (1921). Scullcap.

Common in wet meadows throughout the region. Flowers collected in mid-July and August 10. Fruits begin to mature about the first of August.

East shore of lake Mamawi, No. 3186, Murdock Creek district, No. 3191, Government Hay Camp district, Slave river, No. 3190, near Heart (Raup) lake, No. 3189, near Round lake, about 18 miles south of Pine lake, No. 3192, Moose (Eight) Lake district, Nos. 3187, 3188, Sass creek, *Russell*, No. 16.

Dracocephalum parviflorum Nutt. *Moldavica parviflora* (Nutt.) Britton. Dragon Head.

Common in dry upland openings and clearings, and abundant as a "fireweed" in recently burned areas. Collected in flower from mid-July to late August. Fruit begins to mature about the third week in August.

Along trail about 10 miles southwest of Fitzgerald, No. 3194, Pine Lake district, No. 3193, sink-hole 16 miles east of Moose lake, No. 3195, Moose (Eight) Lake district, No. 3196, base of eastern slope of Caribou mountains, No. 3197.

Physostegia parviflora Nutt. *Dracocephalum Nuttallii* Britton. FALSE DRAGON HEAD.

Common on delta and loess, river flood-plain deposits, where it occupies willow slough margins and low mud flats. Collected in flower late in July and early in August. Immature fruits found August 9.

East shore of lake Mamawi, No. 3183, Murdock Creek district, No. 3184, Government Hay Camp district, Slave river, No. 3185.

Stachys scopulorum Greene. HEDGE NETTLE.

Common in prairies and at the drier margins of sloughs. Young shoots are found late in June or early in July. The first flowers appear about July 10 and fruits being to mature late in July and early in August.

Lower delta of Athabaska river, No. 1248, east shore of lake Mamawi, No. 3170, Murdock Creek district, No. 3181, Government Hay Camp district, Slave river, Nos. 3178, 3180, near Heart (Rasp) lake, No. 3179, Pine Lake district, No. 3175, Round lake, about 18 miles south of Pine lake, No. 3176, Peace point, Nos. 3177, 3182, sink hole 16 miles east of Moose lake, No. 3174, base of eastern slope of Caribou mountains, Nos. 3171, 3172, 3173, junction of Nyarling and Little Buffalo rivers, *Russell*, No. 67.

Monarda mollis L. var. **menthaefolia** Fernald. *See* Rhod. xx, 15 (1901). WILD BERGAMOT, HORSE MINT.

Collected thus far only on the Peace Point prairie, where it was in flower July 17.

Peace point, No. 3160.

Mentha canadensis L., var. **glabrata** (Benth.) Fernald. CANADA MINT.

The common mint of sloughs, wet meadows, and stream margins throughout the region. The height of its flowering season appears to be about mid July, and fruit is matured in August.

Lower delta of Athabaska river, No. 1247, east shore of lake Mamawi, No. 3168, Murdock Creek district, No. 3164, Government Hay Camp district, Slave river, No. 3163, Pine Lake district, No. 3161, Round lake, about 18 miles south of Pine lake, No. 3162, Peace point, Nos. 3165, 3166, sink-hole 16 miles east of Moose lake, No. 3167, Indian graveyard, Peace river, No. 3169, "Wood Buffalo park," *Russell*, No. 99.

SCROPHULARIACEAE

Veronica scutellata L. MARSH SPEEDWELL.

Common in wet sloughs, chiefly in or near the lowland districts. Found in flower June 23, and with both flowers and fruit July 21.

Government Hay Camp district, Slave river, No. 3148, Fort Smith, No. 1252, Peace point, No. 3149.

V. peregrina L. var. **xalapensis** (HBK.) Pennell. *V. xalapensis* HBK. *See* Torreya xix, 167 (1919). SPEEDWELL.

Occasional in dry prairie openings and rock crevices. Fruits mature in August, although occasional flowers may be found as late as August 20. Reported poisonous.

East shore of lake Mamawi, No. 3146, sink-hole 16 miles east of Moose lake, No. 3147.

Castilleja Rauplii Pennell. *See* Proc. Acad. Nat. Sci. Phila. lxxxvi, 528-31 (1934) INDIAN PAINT-BRUSH.

Occasional in open upland woods, but found commonly at the willow margins of streams and wet meadows. Early flowers have been found in mid-June, but the height of the flowering season does not come until late June and early July. Mature fruit has been collected in the second week of August.

30th base line district, Slave river, No. 1258, Fort Smith, No. 1261; Pine Lake district, Nos. 3153, 3154, 3155, 3156, 3157, Moose (Eight) Lake district, Nos. 3150, 3158, 3159, base of eastern slope of Caribou mountains, Nos. 3151, 3152, lower Slave river, No. 1262.

Rhinanthus Kyrollae Chab.

Apparently rare or only occasional in the region, and collected thus far only at the willow margin of a prairie about 6 miles north of Peace river, near the base of Caribou mountains. In both flower and fruit July 28.

Base of eastern slope of Caribou mountains, No. 3145-a.

Orthocarpus luteus Nutt.

Rare and found thus far only in dry prairies. Peace point, No. 4394 (1932).

Pedicularis labradorica Houdyn. *See* Rhod. xxxiii, 193 (1931) LOUSEWORT.

Apparently limited to muskegs in Caribou mountains, where it is common, and found in flower July 11-12.

Eastern edge of Caribou Mountain plateau, No. 3145.

LENTIBULARIACEAE

Utricularia vulgaris L. GREAT BLADDERWORT.

Abundant in shallow lakes and sluggish streams throughout the region. Collected in flower from the second week in July to the second week in August.

Cree (Mamawi) creek, No. 3139, Pine Lake district, Nos. 3140, 3141; near Round lake, about 18 miles south of Pine lake, No. 3142, Moose (Eight) lake, Nos. 3143, 3144, Grande Detour portage, lower Slave river, *Russell*, No. 74.

U. minor L. SMALL BLADDERWORT.

Probably common in shallow lakes throughout the area, but collected thus far only from Moose lake, where it was in a sterile condition August 5.

Moose (Eight) lake, No. 3138.

PLANTAGINACEAE

Plantago major L., var. **asiatica** (L.) Decne. COMMON PLANTAIN.

Common on river banks and in damp, sandy meadows on the uplands. New rosettes collected in mid-June and flower buds June 23. Flowers and immature fruits collected July 14, and mature fruits in August.

Reed portage, upper Embarras river, No. 3132, 30th base line district, Slave river, No 1295, Murdock Creek district, No. 3134, Government Hay Camp district, Slave river, No. 3135, Fort Smith, No 1294; Round lake, about 18 miles south of Pine lake No. 3136, Peace point, No 3133 sink-hole 16 miles east of Moose lake, No. 3137

P. eriopoda Torr. SALINE PLANTAIN

Common in saline parts of the Salt Plain prairies. Collected in flower June 15 and in fruit August 19.

Near Heart (Raup) lake No 3129, near Mission Farm, No. 3130.

P. oliganthos R. and S. SCRAWNY PLANTAIN

Probably common on the saline flats in the Salt Plain district, but collected from only one locality. In fruit August 20.

Near Heart (Raup) lake, No. 3131

RUBIACEAE

Galium boreale L. NORTHERN BEDSTRAW

Abundant in dry open woods prairies, and clearings. Young shoots collected as early as June 9, and buds June 13. The first flowers appear about the last of June, and fruits are matured in August.

East shore of lake Maman No 3112 along Quatre Fourches river, No 1303 30th base line district Slave river No 1302 Government Hay Camp district Slave river Nos 3107, 3108 near Heart (Raup) lake, Nos 3099 3104 Fort Smith No 1304 near Mission Farm No 3103 Pine Lake district Nos 3100 3101 3102 Peace point Nos 3105, 3106, Moose (Eight) Lake district Nos 3109, 3110 3111 Indian graveyard, Peace river, No 3113 base of eastern slope of Caribou mountains, Nos 3114, 3115, junction of Nyarling and Little Buffalo rivers, *Russell*, No 55.

G. trifidum L. SMALL BEDSTRAW

The writer's collections of this species are fairly uniform with the exception of No 3116, obtained in a slough at the Indian graveyard, Peace river. This material is without flower or fruit but has the general appearance of *G. Brandegei* Gray. It was growing in water, however, and may be only a form of *G. trifidum* with expanded leaves.

Abundant in sloughs and damp meadows throughout the area. Flowers collected June 23 and through July. A few flowers remain in August, but fruits begin to mature in late July.

Murdock Creek district No 3128 Government Hay Camp district, Slave river Nos 3122 3126 Fort Smith, No 1300, Pine Lake district, Nos 3119 3120 3127 Round lake about 18 miles south of Pine lake, No 3121, sink-hole 16 miles east of Moose lake No 3125 Moose (Eight) Lake district, Nos 3123, 3124, Indian graveyard, Peace river, Nos 3116, 3117, base of eastern slope of Caribou mountains, No 3118, Little Buffalo river, *Russell* No. 86.

G. triflorum Michx. FRAGRANT-SCENTED BEDSTRAW

Rare in Wood Buffalo park, and collected thus far only in the Athabaska Peace delta. In a late fruiting condition August 18.

Reed portage, upper Embarras river, No. 3008, along Quatre Fourches river, No 1301

CAPRIFOLIACEAE

Viburnum pauciflorum Raf. MOOSEBERRY, HIGH-BUSH CRANBERRY

Abundant in open woodlands throughout the region. In late July and in August it bears an abundance of bright red berries which, although they have rather large seeds and are somewhat tart, make excellent pies. The height of the flowering season is in the latter half of June.

East shore of lake Mamawi, No. 3084; along Quatre Fourches river, No. 1327; 30th base line district, Slave river, No. 1322, Government Hay Camp district, Slave river, No. 3081; Fort Smith, No. 1324; Pine Lake district, Nos. 3080, 3083, Peace point, No. 3082; Moose (Eight) Lake district, Nos. 3077, 3078, 3079, Indian graveyard, Peace river, No. 3085, base of eastern slope of Caribou mountains, No. 3087, eastern slope of Caribou Mountain plateau, No. 3086.

Symphoricarpos occidentalis Hook. WOLFBERRY.

Abundant in the dried parts of the upland semi-open prairies. It flowers during the latter half of July and the first half of August.

East shore of lake Mamawi, No. 3061; Government Hay Camp district, Slave river, No. 3064; Round lake, about 18 miles south of Pine lake, No. 3066, Peace point, Nos. 3065, 3067, base of eastern slope of Caribou mountains, Nos. 3062, 3063.

S. albus (L.) Blake, var. **pauciflorus** (Robbins) Blake. *S. pauciflorus* (Robbins) Britton, *S. racemosus* Michx., var. *pauciflorus* Robbins. SNOWBERRY.

Abundant in open woods, chiefly poplar, and common in semi-open prairies. Flower buds appear about the first of July and immature fruit late in July. Fruit is matured during the first half of August.

East shore of lake Mamawi, Nos. 3075, 3076, Government Hay Camp district, Slave river, No. 3072, near Heart (Raup) lake, No. 3068, Fort Smith, No. 1320, near Mission Farm, No. 3070, Pine Lake district, No. 3071, Peace point, No. 3069, Indian graveyard, Peace river, No. 3074, base of eastern slope of Caribou mountains, No. 3073, Little Buffalo river, *Russell*, No. 102.

S. vaccinoides Rydb.

This material is not in flower or fruit, and is, therefore, of somewhat doubtful identity. It is placed in this species on the strength of its acute or nearly acute leaves.

Collected thus far only on a granite hill in the Peace delta.

Along Quatre Fourches river, No. 1321.

Linnaea borealis L., var. **americana** (Forbes) Rehder. *L. americana* Forbes. TWINFLOWER.

Abundant in shady woodlands throughout the region. Its flowering season begins in the latter part of June and reaches its height in the first half of July. Fruits are mature in August.

Along Quatre Fourches river, No. 1307, Government Hay Camp district, Slave river, No. 3053, Fort Smith, No. 1311, Pine Lake district, Nos. 3054, 3055, 3057, 3058; Peace point, No. 3056, Moose (Eight) Lake district,

No 3052 base of eastern slope of Caribou mountains, No. 3060, eastern edge of Caribou Mountain plateau No. 3059, Little Buffalo river, *Russell*, No 69

Lonicera glaucescens Rydb. HONEYSUCKLE.

Common in open woods (chiefly poplar) on the upland Buds appear about mid-June, and flowers in the last third of June Immature fruits appear about the last week of July and mature ones in August.

East shore of lake Mamawi. No 3088 Fort Smith, No. 1318, Pine Lake district No. 3095, Peace point, No 3093, Moose (Eight) Lake district, Nos 3091 3092, 3096, base of eastern slope of Caribou mountains, Nos. 3089, 3090.

VALERIANACEAE

Valeriana septentrionalis Rydb *V sylvatica* Banks.

Occasional in upland muskeg thickets. Collected in flower and immature fruit during the last third of June.

Pine Lake district, Nos. 3050, 3051.

CAMPANULACEAE

Campanula rotundifolia L. BELL-FLOWER, BLUEBELL.

Common in upland open woods and in the drier parts of the semi-open prairies It is a characteristic species, also of the granite hills. Seedlings are found both early and late in June and buds during the first week in July The height of the flowering season is in the latter half of July

East shore of lake Mamawi No 3048, along Quatre Fourches river, No. 1331 Government Hay Camp district, Slave river No. 3045, near Heart (Raup) lake, No 3046 Pine Lake district, Nos. 3041, 3042, Peace point, Nos 3043, 3044, base of eastern slope of Caribou mountains, No. 3047 Little Buffalo river, *Russell*, No. 89.

COMPOSITAE

Grindelia perennis A Nels. *See* Ann. Mo. Bot. Gard. xxi, 485-8 (1934) RESIN-WEED, GUM-PLANT.

Common on the Salt Plain prairies, where it was collected in flower August 19-20. Used medicinally for catarrhal disorders.

Near Heart (Raup) lake, Nos. 3287, 3288.

Solidago multiradiata Ait., var **scopulorum** Gray GOLDENROD.

Common in clearings and in damp woods and thickets. In flower from about mid July to about mid-August.

Government Hay Camp district, Slave river Nos. 3265, 3266, near Heart Raup) lake, No. 3264, Pine Lake district, No 3267, Moose (Eight) Lake district No. 3268, base of eastern slope of Caribou mountains, Nos. 3269 3270. 3272 3273, 3274, eastern edge of Caribou Mountain plateau, No. 3271.

S. oreophila Rydb.

Common in dry prairies, clearings and on rocky hills throughout the upland districts. Flowers appear in late June or early July, and continue until late in August.

Government Hay Camp district, Slave river, No. 3255, near Heart (Raup) lake, No. 3256; Fort Smith, No. 1367 (*Mrs. Conibear* coll.), Pine Lake district, Nos. 3258, 3259, Peace point, Nos. 3254, 3257, Moose (Eight) Lake district, Nos. 3260, 3261, Indian graveyard, Peace river, No. 3262; Little Buffalo river, *Russell*, No. 46.

S. canadensis L. CANADA GOLDENROD.

Common in clearings, open woods, and prairies throughout the region. It becomes abundant in the prairies at the base of Caribou mountains. Flower buds collected in late June and the first half of July. The flowering period begins about the third week in July and lasts through most of August.

East shore of lake Mamawi, No. 3275; Government Hay Camp district, Slave river, Nos. 3280, 3282; near Heart (Raup) lake, No. 3281, Peace point, No. 3283, Moose (Eight) Lake district, Nos. 3284, 3285, 3286, Indian graveyard, Peace river, No. 3276, base of eastern slope of Caribou mountains, Nos. 3277, 3278, 3279, lower Slave river, No. 1357.

S. graminifolia (L.) Salisb. var. **camporum** (Greene) Fernald. *Euthamia camporum* Greene. See Rhod. xvii, 12 (1915).

Collected thus far only in the Hay (Prairie) River district of the Peace-Athabaska delta, where it was common and in flower August 18.

Hay (Prairie) river, near east shore of lake Claire, No. 3263.

Aster conspicuus Lindl. ROUGH ASTER.

Common in poplar woods on the eastern slopes of Caribou mountains and on a poplar bluff near the Indian graveyard, Peace river. Flower buds collected July 12, and flowers July 23 and 31.

Indian graveyard, Peace river, No. 3237, eastern slope of Caribou mountains, Nos. 3235, 3236.

A. modestus Lindl.

Apparently rare in the park area, and found thus far only in the upper delta of Athabaska river. In flower August 15.

Reed portage, upper Embarras river, No. 3213.

A. Lindleyanus T. and G.

Probably the commonest aster in the region. It is abundant in open woods and clearings throughout, and occasional in semi-open places. Rosettes have been observed late in June, and buds in the latter part of July. The first flowers appear late in July, and reach their prime during the first half of August.

Reed portage, upper Embarras river, No. 3239, Government Hay Camp district, Slave river, Nos. 3245, 3246, 3248, 3249; near Heart (Raup) lake, No. 3247; near upper South rapids, No. 1354, Fort Smith, No. 1353 (*Mrs. Conibear* coll.), Pine Lake district, No. 3243, Peace point, No. 3244, Moose (Eight) Lake district, Nos. 3250, 3251, 3252, 3253, Indian graveyard, Peace river, No. 3240, base of eastern slope of Caribou mountains, Nos. 3241, 3242.

A. Lindleyanus T. and G., var comatus Fernald

This variety has been found in only one locality, a poplar bluff along Peace river just inside the western boundary of the park. In flower August 1.

Indian graveyard, Peace river, No. 3238.

A. laevis L., var Geyeri Gray.

Occasional in the driest upland prairies. First flowers appear in the last week of July, and flowering continues at least through the first half of August.

East shore of lake Manawan Nos. 3233, 3234; base of eastern slope of Caribou mountains, No. 3232.

A. ericoides L. *A. multiflorus* Ait. *See* Rhod. xxvii, 65 (1926) and xxxii, 136-40 (1930).

Common in dry prairies and in the drier parts of lowland hay meadows. Specimens collected July 17 were not yet in flower. Flowers appear in August.

Government Hay Camp district, Slave river, No. 3227, near Heart (Raup) lake, Nos. 3228, 3229; Peace point, No. 3230, Little Buffalo river near Lobstick creek, *Russell*, No. 2.

A. junceus Ait.

One of the commonest asters in the region. It is abundant on stream banks and in wet meadows and is in flower during the latter part of July and in August.

East shore of lake Manawan Nos. 3217, 3218, 3219; Murdock Creek district, No. 3221; Government Hay Camp district, Slave river, Nos. 3220, 3223, near Heart (Raup) lake, No. 3222, near upper Smith rapids, No. 1351; Moose Light Lake district, Nos. 3224, 3225, 3226, Little Buffalo river, *Russell*, Nos. 42, 78.

A. puniceus L.

Found thus far only in clearings and wet meadows in the river lowlands, where it is common. It flowers in late July and in August.

Reed portage, upper Embarras river, No. 3214; Murdock Creek district, No. 3215; Government Hay Camp district, Slave river, No. 3216.

A. puniciflorus Nutt.

Probably common on the Salt Plains, where it was found in flower August 19.

Near Heart (Raup) lake, No. 3231.

Erigeron glabellus Nutt. Daisy Fleabane

Occasional in the driest parts of upland semi-open prairies. Found flowering in the latter half of June and early August.

Peace point, Nos. 3313, 3314, base of eastern slope of Caribou mountains, No. 3312.

E. hyssopifolius Michx.

Occasional in the damp soil of upland thickets and river flood-plains. Found in flower during the latter half of June and most of July

30th base line district, Slave river, No 1349, Pine Lake district, No 3292, near Round lake about 18 miles south of Pine lake, No 3291, Little Buffalo river, *Russell*, No. 81

E. philadelphicus L.

Common in damp meadows and on river flood-plains. Flower buds found in mid-June, and flowers during July and August. Fruit begins to mature about the first of August.

East shore of lake Mamawi, No 3308, 30th base line district, Slave river, No. 1342, Government Hay Camp district, Slave river, No 3311, near Heart (Raup) lake, No 3310, Peace point, No. 3309, lower Slave river, No. 1344.

E. ramosus (Walt) B.S.P.

Apparently rare or occasional in the region, and found thus far only on a mud bar along Slave river With flowers and fruit August 14.

Government Hay Camp district, Slave river, No 3306.

E. canadensis L *Leptilon canadense* (L.) Britton HORSEWEED.

Found in a dwarfed condition on a granite hill in Peace River delta In fruit August 7.

East shore of lake Mamawi, No. 3307

E. acris L var **asteroides** (Andrz) DC *E drochbachensis* Mued *See* Rhod xvii 225 (1916) FLEABANE.

Common in clearings and at the margins of meadow sloughs and streams. In flower during the latter part of July and in August Found in fruit in mid-August.

Reed portage, upper Embarras river, No. 3300, Government Hay Camp, Slave river, Nos. 3296, 3297 near upper Smith rapids No 1345, Peace point, No. 3295 Moose (Eight) Lake district, Nos. 3293, 3294, Indian graveyard, Peace river, Nos 3298, 3299.

E. acris L., var **arenans** Fernald. *See* Rhod xxviii, 236 (1926). SWAMP FLEABANE.

Common in muskegs and at wet slough margins In flower from mid-July to mid August.

Observation ridge, about 10 miles south of Pine lake, No. 3301, Moose (Eight) Lake district Nos 3303, 3302, Indian graveyard, Peace river, No. 3305, base of eastern slope of Caribou mountains, No. 3304, Little Buffalo river, *Russell*, No. 77(1).

E. lonchophyllus Hook.

Occasional in semi-open prairies and clearings. Found in flower in mid-July and mid-August.

Near Heart (Raup) lake, No. 3289, Observation ridge, about 10 miles south of Pine lake, No 3290.

Antennaria pulcherrima (Hook.) Greene.

Apparently rare and collected only along the Pine Lake-Peace Point trail. In flower July 14.

Near Round lake, about 18 miles south of Pine lake, No. 3322.

A. rosea (D. C. Eat.) Greene.

Common in dry woods and prairies. Collected in flower during late June and early July.

Fort Smith, No. 1379, Pine Lake district, No. 3325, lower Slave river, No. 1380.

A. nitida Greene.

Common on dry prairies and on rocky hills. Collected in flower during the latter part of July, and in fruit during the first half of August. Occasional flowers occur in mid-August.

East shore of lake Marian, No. 3317, Government Hay Camp district, Slave river, No. 3320, near Heart (Raup) lake, No. 3319, Peace point, Nos. 3316, 3318, sink-hole 16 miles east of Moose lake, No. 3321.

A. oxyphylla Greene.

Rare or only occasional in the park area and collected thus far only in upland aspen woods near Fort Smith. With young flowers June 23.

Fort Smith, No. 1375.

A. campestris Rydb.

Occasional, or possibly common in the upland prairies. In flower June 17.

Pine Lake district, No. 3323.

A. petaloidea Fernald.

Rare or occasional and known thus far only from a single collection in upland jackpine woods. In flower and immature fruit July 5.

Pine Lake district, No. 3324.

A. canadensis Greene.

Probably common in upland semi-open prairies, though it has been collected from only one locality. In flower June 15.

Near Mission Farm, No. 3326.

Gnaphalium uliginosum L. Cudweed.

Apparently rare, and known only from a single specimen collected in a sandy upland sink-hole. In flower July 14.

Round lake, about 18 miles south of Pine lake, No. 3315.

Bidens cernua L. Beggar-ticks, Bur Marigold.

Common on the marshy shores of ponds and lakes. In flower during late July and the first half of August. Immature fruit August 15.

Reed portage, upper Embarras river, No. 3327, Murdock Creek district, No. 3328, shore of Moose (Eight) lake, Nos. 3330, 3329, 3331.

Achillea sibirica Ledeb. *A. multiflora* Hook. *See* Rhod. xxxi, 219 (1929)

A common species of delta slough margins and newly formed local river flood-plains. Buds and young flowers have been found July 18, and the height of the flowering season appears to be late July and early August. Young shoots appear early in June.

East shore of lake Mamawi, No. 3368, 30th base line district, Slave river, No. 1403. Murdock Creek district, No. 3371, Government Hay Camp district, Slave river No. 3370, Peace point, No. 3372, base of eastern slope of Caribou mountains, No. 3369.

A. Millefolium L. Common Yarrow, White-top.

Although the writer's material shows considerable variation he has been unable to make a definite separation of it into more than one species. It includes forms that show many gradations between *A. Millefolium* and *A. lanulosa* Nutt., in the characters commonly used to separate these two. Consequently, until further critical study has been made it is thought best to determine it as above.

A common species of prairies, damp meadows, and clearings throughout the area. Flower buds appear about mid-June, and the first flowers about July 1. Flowering continues through the middle part of August.

East shore of lake Mamawi, No. 3345. Government Hay Camp district, Slave river, Nos. 3353, 3357, 3358, near Heart (Raup) lake, Nos. 3352, 3354. Fort Smith, Nos. 1398, 1399 (*Mrs. Conibear* coll.), near Mission Farm, No. 3360. Pine Lake district, No. 3359. Peace point, Nos. 3355, 3356, sink-hole 16 miles east of Moose lake, No. 3362, Moose (Eight) Lake district, Nos. 3361, 3363, 3364, 3365, 3366, 3367, Indian graveyard, Peace river, No. 3346, base of eastern slope of Caribou mountains, Nos. 3347, 3348, 3349, 3350, 3351, junction of Little Buffalo and Nyarling rivers, *Russell*, No. 8, Little Buffalo river near the 60th parallel, *Russell*, No. 85.

Chrysanthemum Leucanthemum L., var. **pinnatifidum** Lecoq and Lamotte. Ox-eye Daisy.

Collected thus far only in an upland cabin clearing, where it is probably adventive. In flower July 6.

Pine Lake ranger station, No. 3344.

Artemisia canadensis Michx. Canada Wormwood.

Occasional in dry prairies and on sandy banks. Flower buds collected early in July, and flowers in the latter part of August.

Near Heart (Raup) lake, No. 3338. Fort Smith, No. 1388 (*Mrs. Conibear* coll.), Pine Lake district, No. 3340, sink-hole 16 miles east of Moose lake, No. 3339.

A. dracunculoides Pursh. Wormwood.

Common in the drier parts of the semi-open prairies. Young flowers found in the latter part of July.

Peace point, Nos. 3333, 3334, base of eastern slope of Caribou mountains, No. 3332.

A. biennis Willd.

Occasional in clearings, meadows, and on stream banks. It flowers in the latter half of August

Reed portage upper Embarras river, No 3343, near Heart (Raup) lake, No 3341, sink-hole 16 miles east of Moose lake, No. 3342.

A. frigida Willd. PASTURE WORMWOOD.

Common on very dry prairies and on granite hills. Flower buds appear in the latter part of July and flowers in August.

East shore of lake Mamawi, No. 3335, Peace point, Nos. 3336, 3337.

Petasites palmatus (Ait.) Gray. COLTSFOOT.

Common in open (chiefly poplar) woods throughout the upland. Flowering and fruiting stems found in late June and early July

Fort Smith, No. 1435, Pine Lake district, Nos. 3403, 3404, 3405, Moose (Eight) Lake district, No. 3402, base of eastern slope of Caribou mountains No. 3401 eastern edge of Caribou Mountain plateau, No. 3400.

P. vitifolius Greene.

Common in upland muskegs and wet meadows. Immature fruit collected June 20.

Near Heart (Raup) lake Nos 3406 3407, Pine Lake district, No. 3408: Moose (Eight) Lake district, No 3409, base of eastern slope of Caribou mountains, Nos. 3410, 3411

P. sagittatus (Pursh) Gray

Abundant in muskegs and wet meadows throughout the region. Flowering and fruiting stems collected during the latter half of June.

Government Hay Camp district. Slave river No 3415, near Heart (Raup) lake No. 3413, near Mission Farm, No 3416, Pine Lake district, No. 3414 Moose (Eight) Lake district, Nos. 3417 3418, 3419, base of eastern slope of Caribou mountains, No. 3420, Clewi river, *Russell*, No. 15.

Arnica chionopappa A. Nels. ARNICA.

Common at the margins of some of the upland semi-open prairies. It usually grows around the willow clumps in such places, and flowers in the latter part of July.

Peace point. No. 3378, base of eastern slope of Caribou mountains, Nos. 3379 3380, 3381, 3382.

A. chionopappa Fernald *See* Rhod. xxxv 336-7 (1933)

Common in dry upland woods and on rocky hills Found in flower in the latter part of June and in July Fruiting heads appear in August.

Government Hay Camp district. Slave river No. 3377, Fort Smith, No 1408 Pine Lake district Nos. 3373, 3374, 3375 sink-hole 16 miles east of Moose lake No. 3376, lower Slave river, No. 1409

Senecio eremophilus Richards.

Collected thus far only in lowland clearings and hay meadows, where it is common. Found in flower during the first half of August.

Reed portage, upper Embarras river, No. 3391, Government Hay Camp, Slave river, Nos. 3392, 3393.

S. indecorus Greene. *See* Rhod. xxvi, 120 (1924) RAGWORT

Common in lowland wet meadows and occasional at upland prairie margins. Flowers collected in the latter half of July and early August, and immature fruit in the first week in August.

Murdock Creek district, No. 3388, Government Hay Camp district, Slave river, No. 3387. Indian graveyard, Peace river, No. 3390, base of eastern slope of Caribou mountains, No. 3389.

S. pauperculus Michx. *See* Rhod. xxiii. 299 (1921)

Common in muskegs, rich woods, and damp meadows throughout the region. Found in flower from late June to about mid-August.

Murdock Creek district, No. 3398, Government Hay Camp district, Slave river, No. 3394, Pine Lake district, No. 3397, Moose (Eight) Lake district, Nos. 3395, 3396, base of eastern slope of Caribou mountains, No. 3399, lower Slave river, No. 1417.

S. cymbalarioides Nutt. var. **borealis** (T. and G.) Greene. *See* Ann. Mis. Bot. Gard. iii. 177 (1916)

Occasional in dry upland woods. Collected in flower in the latter part of June, and with immature fruit July 14.

Fort Smith, Nos. 1424, 1429. Pine Lake district, No. 3386, Moose (Eight) Lake district, No. 3385.

S. palustris (L.) Hook.

Common in lowland sloughs and wet meadows. Found in flower from mid-June to the latter part of July. Immature fruit collected August 15.

Reed portage, upper Embarras river, No. 3383, lower delta of Athabaska river, No. 1420, 30th base line district, Slave river, No. 1419, Government Hay Camp district, Slave river, No. 3384, Little Buffalo river, *Russell*, No. 40.

Cirsium Drummondii T. and G. THISTLE.

Common in prairies and the drier parts of lowland wet meadows. Rosettes collected in mid-June, and late flowers and fruit the first week in August.

30th base line district, Slave river, No. 1437, Government Hay Camp district, Slave river, No. 3422, Peace point, No. 3421, Clewi river, *Russell*, No. 49.

Hieracium canadense Michx. HAWKWEED.

Common in upland open woods, and at the willow margins of prairies and sloughs. Flower buds observed in the first half of July, and the first flowers in late July and early August. Immature fruits appear in the last half of August.

East shore of lake Mamawi, No. 3432, Government Hay Camp district, Slave river, Nos. 3423, 3424, near Heart (Raup) lake, No. 3425, Fort Smith, No. 1442, sink hole 15 miles east of Moose lake, No. 3427,

Moose (Eight) Lake district, Nos 3426, 3428, 3429, Indian graveyard, Peace river, No. 3431, base of eastern slope of Caribou mountains, No. 3430.

Taraxacum ceratophorum (Ledeb.) DC *See* Rhod xxxv 369-86 (1933) for a treatment of this and the following

Occasional in open upland woods and clearings.

Pine Lake district, Nos. 3447, 3445, 3444, 3446, eastern slope of Caribou mountains, No. 3439.

T. dumetorum Greene.

Occasional in open woods, clearings, and prairies throughout the region.

Government Hay Camp, Slave river, No. 3441, Fort Smith, No. 1446; Pine Lake district, No. 3442, Peace point, No 3443, base of eastern slope of Caribou mountains Nos. 3437, 3438, 3440.

Lactuca pulchella (Pursh) DC WILD BLUE LETTUCE.

Common in clearings and in the unstable soil of stream banks, chiefly in the lowlands Found in flower from late June to mid-August.

Reed portage, upper Embarras river, No. 3433, Murdock creek, No. 3436, Government Hay Camp district, Slave river, No. 3434, Peace point No 3435, lower Slave river, No. 1444.

Summary of Plants Treated in this Catalogue

	Families	Genera	Species	Varieties and forms	Total number of different plants[1]
Pteridophyta	4	8	17	2	17
Gymnospermae	1	5	8	2	8
Monocotyledoneae	14	58	140	23	145
Archichlamydeae	30	79	172	25	177
Metachlamydeae	17	61	112	17	114
Totals	66	211	449	69	461

[1]There are fifty-seven species which are represented only by one or more varieties or forms. The figures for the total number of different plants are obtained by subtracting these species from the total numbers of species, varieties, or forms.

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